LOCKEFORD PLANT MATERIALS CENTER

ANNUAL TECHNICAL REPORT

2004

A Technical Summary of Plant Materials Studies
at the Lockeford Plant Materials Center
Lockeford, California

FOR MORE INFORMATION CONTACT:
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INTRODUCTION, HISTORY AND FACILITIES

The Lockeford Plant Materials Center (PMC) is a federally owned and operated facility under the administration of the California State Office of the USDA Natural Resources Conservation service. The Lockeford PMC produces plant materials in cooperation with California Resource Conservation Districts, University of California, Foundation Seed Service, Agriculture Cooperative Extension, and the California Crop Improvement Association.

The plant materials program began February 1935 with the Soil Conservation Service Plant Materials Nursery at Santa Paula, California. In 1939 a 60-acre Plant Materials Center was established at Pleasanton, California. In September 1972 the Pleasant PMC was moved to the current site at Lockeford California.

The California plant materials program and the Lockeford PMC provide plant science support to the USDA-NRCS California Field Offices. The California Plant Materials Center in Lockeford collects promising plants and tests their performance under a variety of soil, climatic and use conditions. Over the past fifty years, 31 plants have been released for commercial seed production to solve soil and water conservation problems.

The Lockeford plant materials center is 106.7 acres of prime farmland located along the Mokelume River near Lockeford California. Irrigation water is available to all fields at the PMC. Initial and advance evaluation of new plant materials are conducted at this site. The PMC responsible for seed increase plantings of potentially valuable plant species and for the maintenance of seed stock of California cooperative releases. Field Evaluation Plantings (FEP's) are studies conducted away from the PMC at problem sites in cooperation with federal, state, municipal agencies, and private individuals.

PERSONNEL

STATE CONSERVATIONIST

Lincoln Burton

Plant Resource Specialist

Vacant

NAT'L PLANT MATERIALS SPECIALIST

Robert Escheman

PLANT MATERIALS CENTER STAFF

Position	Name	Start	End
PMC Manager	David Dyer	03/03/87	Present
Farm Supt.	Celm Avitia	04/12/76	Present
Gardener	Jim Hutson	02/01/88	Present

CALIFORNIA PLANT MATERIALS COMMITTEE

State Office
DIANE HOLCOMB - State Resource Conservationist
- State Biologist
JERRY REIOUX - State Forester

- State Range Ecologist
BOB FRY - State Agronomist
ALAN FORKEY - State Wetlands Biologist
CHARLES DAVIS - State Conservation Engineer
LORI METZ - Representing State Soil Scientist

Area I
JOHN WEATHERFORD - Soil Conservationist
ANN FRANCIS - Landscape Ecologist
DENNIS MOORE - Area I Resource Conservationist

Area II
SALLY NEGRONI - Soil Conservationist
PHIL BLAKE - District Conservationist

Area III
JOE WILLIAMS - Cluster Agronomist

Area IV
RITA BICKEL - Area IV Resource Conservationist

PMC
DAVE DYER - PMC Manager

MAJOR LAND RESOURCE AREAS SERVED

4 - CA. Coastal Redwood Belt
5 - Siskiyou - Trinity
14 - Central CA. Coastal Valleys
15 - Central CA. Coast Range

16 - CA. Delta
17 - Sacramento and San Joaquin Valleys
18 - Sierra Nevada Foothills
19 - S. CA. Coastal Plain
20 - S. CA. Mountains
21 - Klamath and Shasta Valleys
22 - Sierra Nevada Range
29 - S. Nevada Basin

NEWLY RELEASED PLANTS FROM THE LOCKEFORD PMC

LK 517f Germplasm Saltgrass Distichlis spicata 2001 # 9032700

Application for Selected Reproductive Material Certification

David A. Dyer, Plant Materials Center Manager, USDA Natural Resources Conservation Service, P.O. Box 68, Lockeford, California, 95237
Phone: 209-727-5319; E-mail: Dave.Dyer@ca.usda.gov

A. Genus: Distichlis Species: spicata (L.) Greene
Variety/ssp: Select class LK 517f Germplasm Common Name: Saltgrass

B. Origin of the material.
State: CA County: Tulare Elevation: 246 feet MLRA: 17f
Mean Annual Precipitation: 7 to 10 inches

C. Method of Selection for Selected and Tested Materials. LK 517f saltgrass was sleeted and tested by the USDA Natural Resources Conservation Service under accession number 9032700.

LK 517f saltgrass was collected from a native stand near Pixley, California at an elevation of 246 feet above sea level, (legal description T023S – R24E – S10). Employees of the NRCS (formerly the Soil Conservation Service) originally obtained the plant material on May 31, 1982. It was evaluated in a common garden at Lockford plant materials center against 70 other populations assembled form California. In 1993 six accessions were selected for advanced evaluations. In 1993, a replicated advanced evaluation planting of the six accessions was established near Winters, California. The advanced evaluation site had clay soils and was on the side slopes of an irrigation canal. In October 1994, an evaluation confirmed that accession number 9032700 was superior.

D. Botanical/Objective description of species. LK 517f saltgrass is a Califronia native, perennial, warm season grass with extensive creeping, yellowish, scaly rhizomes forming large colonies. LK 517f is coarse-leafed with an average leaf width of .120 inches; average leaf length of 2.9 inches; average height of 8.0 inches.

E. Evidence for Selected Material supporting identity of the species and performance characteristics. LK 517f was not bred but selected for its overall performance and uniformity. It has been evaluated for foliage abundance and uniformity, vigor, and resistance to disease and drought.

Summary of performance data of LK517f saltgrass, Distichlis spicata. Randomized block plots with four replications. Evaluation taken October 1994 near Winters, California. F-A = Foliage Abundance, F-U = Foliage Uniformity, V = Vigor, DI = Disease, DR = Drought.

F-A	F-U	V	DI	DR
4	4.5	3	4	4

Rating criteria: 1= excellent, 9 = poor

F. Area of adaptation and primary use of Selected Materials. LK517f saltgrass primary adaptation is to MLRA 17f; However, it is also adapted to MLRA's 16, 18 and all of MLRA 17. Establishment should be in the late spring using rhizomes or plugs planted on one-foot centers. Irrigation water should be applied the

first summer to ensure stand establishment. LK517f saltgrass is used for riparian restoration and bank and shoreline stabilization.

G. Procedure for maintaining planting stock. The Lockford PMC will maintain breeders and foundation planting stock.

H. Additional restrictions. None.

I. Reference specie sample sent with application forms.

J. Site description. The soil found at the collection site is a deep, poorly drained clay with a clay loam substratum. Slope is 0 to 1 percent. There is a perched water table at a depth of 3 to 6 feet. Annual rainfall is 7 to 10 inches.

K. Information to assist field inspectors. Average height 8.0 inches, average leaf width .120 inches, average leaf length 2.9 inches.

L. Literature review. There is a need for an adapted variety of saltgrass for use through out parts of central California for riparian restoration use and for bank and shoreline stabilization. Saltgrass does not grow straight, but sprawls and forms dense mats. It is a perennial California native grass and grows in or near marsh areas. It is a warm season grass, growing from April to November. Saltgrass can be used for forage. Also, it can tolerate both water logging and long periods of drought.

M. Availability of plant material. Rhizomes or plugs will be made available through the Foundation Seed Service, University of California, Davis.

1. Annual Technical Report – Los Lunas Plant Materials Center, 1980.
2. Reduction of Levee Erosion in the Sacramento – San Joaquin Delta, Department of Environmental Horticulture, UC Davis.
3. The Jepson Manual of Higher Plants of California, Hickman, Ed., 1993.
4. Saline Agriculture, International Affairs National Research Council, 1990.

PLANT RELEASES FROM THE LOCKEFORD PMC

Scientific	Common	Release	Year
Arctostaphylos patula	greenleaf manzanita	Altura	1989
Atriplex canescens	fourwing saltbush	Marana	1979
Atriplex lentiformis	big saltbush	Casa	1979
Bromus carinatus	California brome	Cucamonga	1949
Bromus hordeaceus ssp.	soft chess	Blando	1954
Ceanothus cordulatus	mountain whitethorn	Maleza	1989
Ceanothus x flexilis	ceanothus	Cuesta	1991
Cleome isomeris	bladderpod	Dorado	1979
Dactylis glomerata	orchardgrass	Akaroa	1953
Dactylis glomerata	orchardgrass	Berber	1981
Elymus glaucus	blue wildrye	Mariposa	2000
Eriogonum fasciculatum	California buckwheat	Duro	1983
Eriogonum umbellatum var. polyanthum	sulphur flower buckwheat	Sierra	1987
Leymus triticoides	beardless wildrye	Rio	1991
Lolium rigidum	annual ryegrass	Wimmera 62	1962
Nassella cernua	foothill needlegrass	LK415f Germplasm	1998
Nassella pulchra	purple needlegrass	LK115d Germplasm	1998
Nassella pulchra	purple needlegrass	LK215e Germplasm	1998
Nassella pulchra	purple needlegrass	LK315d Germplasm	1998
Phalaris aquatica	koleagrass	Perla	1970

Purshia tridentata	bitterbrush	Lassen	1984
Trifolium hirtum	rose clover	MonteFrio	1991
Trifolium hirtum	rose clover	Wilton	1967
Vicia villosa ssp. varia	woollypod vetch	Lana	1956
Vulpia myuros	annual fescue	Zorro	1977

CURRENT STUDIES AND INITIAL AND ADVANCED EVALUATION PLANTINGS

The following studies were requested from NRCS field offices and relate to the Plant Materials Program and Lockeford PMC strategic plan and business plan. In many cases, the NRCS field office staff worked closely with Dave Dyer, PMC Manager, in developing these studies and in some locations they took the lead in data collection. Many landowners helped with site preparation, plot lay out, fencing, planting and application of treatment materials and management treatments. Also, due to NRCS field office and Lockeford PMC staff networking efforts, many NRCS partners and Conservation Districts helped make these studies happen.

CALIFORNIA CROP IMPROVEMENT ASSOCIATION

Application for Selected Reproductive Material Certification

Name/Address of Applicant/Collector

David A. Dyer, Plant Materials Center Manager, USDA Natural Resources Conservation Service, P.O. Box 68, Lockeford, CA 95237
Phone: 209-727-5319; E-mail: Dave.Dyer@ca.usda.gov

A. Genus: Achnatherum Species: occidentale

Variety/ssp: Select class LK 621e Germplasm Western Needlegrass
Common Name: Western Needlegrass

B. Origin of the material.

State: CA County: Modoc Elevation: 4600 - feet MLRA: 21e
Mean Annual Precipitation: 10 to 16 inches

C. Method of Selection for Selected Materials.
LK 621e Germplasm Western Needlegrass was selected and tested by the USDA Natural Resources Conservation Service under accession number 9082913.

LK 621e was collected from a native stand five miles southwest of Canby, California at an elevation of 4600 feet above sea level. Employees of the NRCS originally obtained the seed in 1997. It was evaluated in a common garden at Lockeford plant materials center against 16 other achnatherum populations assembled from California. The 2003 evaluation confirmed that accession number 9082913 was superior.

LK 621e can be distinguished from other populations tested by its combination of (1) greater foliage size and abundance, (2) excellent vigor, (3) good seed amount and fill. LK 621e maintains a good vigor for the first two years and ranks high in terms of foliage appearance.

LK 621e is a California native tufted perennial bunchgrass. LK 621e is suitable for erosion control and quick, self-perpetuating cover. Prior to maturity, Western needlegrass is considered good forage for cattle, horses, sheep and deer.

D. Botanical/Objective description of species.

Morphological description
Western Needlegrass is an erect perennial grass. Foliage is blue green. Blade width is 1 to 2 cm, 10 to 20 cm long, usually involute. The seed head height is 50 to 100 cm.

Agronomic characteristics

The seed germinates with autumn rains and early growth is satisfactory as long as soil moisture and temperature is suitable. Minimum rainfall requirements vary from 10 to 12 inches depending on soil type, elevation and aspect.

Flowering occurs in the late spring typically April to May. Adequate moisture will promote good seed set, but even under adverse conditions of low moisture, seed will be produced in most years. Seed is ripe 6 to 9 weeks after flowering. There are 311,000 seeds per pound. The planting rate for most vegetative practices is 5 pounds pure live seed per acre drilled and 7 pounds pure live seed per acre broadcast.

LK 621e has shown a preference for loam to clay loam soils. It can persist on moderately deep road cut slopes. It is best grown for seed on well to moderately well drained, moist, medium textured soils. It does not tolerate poor drainage or prolonged flooding. It can be harvested with a flail vac harvester and multiple harvest trips can be maid during the 2 to 3 week seed maturity period.

E. Evidence for selected material supporting identity of the species and performance characteristics.

LK 621e Germplasm Western Needlegrass was not bred but selected for its overall performance and uniformity. It has been evaluated for foliage size, uniformity, vigor and seed production. The common garden had a randomized complete block design with three replications. Two year average summary of performance data of LK 621e, Achnatherum occidentale*, accession number 9082913*. Evaluations were taken June 2002 and 2003 at the Lockeford Plant Materials Center, 100 feet elevation. %S = %Stand, F-S = Foliage Size, F-U = Foliage Uniformaty, S-A = Seed Amount, S-F = Seed Fill, V = Vigor.

%S	F-S	F-U	S-A	S-F	V
100	**3.3**	**2.5**	**2.5**	**3.5**	**3.3**

Rating criteria: 1 = excellent, 9 = poor

LK 621e has an average width of 25 cm, an average leaf area height of 20 cm, and average seed head height of 92 cm, an average leaf width of 1 mm and an average of 51 culms per bunch. It was superior in height, number of culms per bunch, seed amount and fill and vigor.

F. Areas of Adaptation

LK 621e is primarily adapted to MLRA 21e; However, it is also adapted to MLRA's 5; 14; 15c,d,e; 16; 17d,e; 18; 22; 23; 26; 29 and all of MLRA 21. It is not adapted above 10,000 feet elevation. Establishment should be in the fall.

G. Procedure for maintaining stock seed classes.

The multiplication generations are breeders and foundation. Foundation seed can be produced from foundation seed in the event breeders seed is depleted. The Lockeford PMC will maintain breeders and foundation seed.

I. Additional restrictions. **None**

J. Reference specie sample. **Sent with application forms.**

J. Site description. **The soil found at the collection site is a moderately deep cobbly loam, 9 to 30 percent slope. Annual rainfall is 10 to 16 inches.**

K. Information to assist field inspectors. **Average seed head height 90 cm, average leaf width 1 mm, average leaf length 20 cm.**

L. Literature review. **There is a need for an adapted selection of Western needlegrass for use through out parts of north east California for restoration and revegetation use. Western needlegrass provides good protection from soil erosion and can be used for forage.**

M. Availability of plant material. **Foundation seed will be made available through the California Crop Improvement Association and the Foundation Seed Service, University of California, Davis.**

Study Number 0610008B Nesella pulchra genetic analysis

Study Confirm diversity of Nesella pulchra with ARS and San Francisco urban office. A paper titled Nucleotide Sequence Variation Among Natural Populations and Commercial Germplasm Sources of Purple Needlegrass was developed and was sent to field offices as a technical note.

Purpose	Technology Development	**Species**	1
Funding:	other	**Native**	1
Duration	1998 - 2001	**Accessions**	10
National	Natural Areas 1.1	**Accessions**	0
Status	Active **Plots:**		0
Type:	Advanced	**Evaluations**	1
Evaluated:	Y		

SWAPA+H:	NRCS		Resource
Human	CRP	10%	Buffers
Plants	CTA	10%	Grazing Land Conservation
Soil	EQIP	10%	Invasive species
	EWP	10%	Native Species
	GLCI	20%	
	UR	30%	
	WHIP	10%	

A paper titled “Mode of reproduction and amplified fragment length polymorphism variation in purple needlegrass (Nassella pulchra): utilization of natural germplasm sources” was developed. The paper was published in the British Journal of Molecular Ecology (2001) 10, 1165-1177. This paper was an USDA team effort involving the Agricultural Research Service, Natural Resources Conservation Service - Lockeford Plant Materials Center and San Francisco Urban Office.

The paper provides a source of information and background for personnel who are providing restoration and revegitation alternatives to landowners. It gives guidance on the genetic diversity of purple needlegrass and the result of distance from the seed source to the planting site. The USDA-ARS did the laboratory work and data analysis. LK315d purple needlegrass was determined to have a high level of genetic diversity and would be very appropriate for use in the eastern bay area and close enough to the San Francisco population to be considered for use in the western bay area.

Study Number 06C0003A Vegetative control of Medusahead

Study Evaluate Lana vetch broadcast seeding rates with P application for control of Medusahead.

Purpose	Technology Development	**Species**	1
Funding:	NRCS	**Native**	0
Duration	1999 - 2002	**Accessions**	1
National	Rangeland 1.1	**Accessions**	0
Status	Active	**Plots:**	18
Type:	Advanced	**Evaluations**	1
Evaluated:	Y		

SWAPA+H:	NRCS		Resource
Animals	CRP	20%	Buffers
Human	CTA	20%	Grazing Land Conservation
Plants	EQIP	20%	Invasive species
Soil	GLCI	20%	Soil, Water, and Air Quality - Other
	WHIP	20%	

ABSTRACT

'Lana' vetch was broadcast seeded with phosphate fertilizer to determine the optimum seeding rate. 'Lana' vetch was successful the first year at the Jackson, California, site in controlling Medusahead when planted at 20 pounds of pure live seed per acre.

INTRODUCTION

Improved methods for the control of the invasive specie Medusahead, *Taeniatherum asperum,* are needed. Medusahead has invaded large areas of rangeland in California and western Oregon and its spread is continuing at a rapid rate. Over-seeding with 'Lana' vetch, *Vicia dasycarpa*, a self-perpetuating annual legume, appears to be a cost effective practical control (1). 'Lana' vetch can be broadcast seeded on rough terrain and established without seedbed preparation. Over-seeding with 'Lana' vetch results in improved forage quality and control of Medusahead. 'Lana' vetch is an improved variety of woollypod vetch which is a reliable self-seeding winter-active annual legume developed by the USDA Natural Resources Conservation Service Lockeford Plant Materials Center. This study evaluated three different broadcast-seeding rates of 'Lana' vetch and phosphate fertilizer applications.

METHODS AND MATERIALS

A randomized block design was used with three treatments and three replications. 'Lana' vetch was broadcast seeded at 12, 16, and 20 pounds of pure live seed (PLS) per acre near Jackson, California, (Camanche hunting club, 600 foot elevation, clay loam soil) and near Red Bluff, California, (1200 foot
elevation, clay soil). Phosphate fertilizer with a 0-45-0 formulation was applied to all plots at the time of seeding at a 200 pounds per acre rate. The plots were 20 by 20 feet in size.

RESULTS AND DISCUSSION

'Lana' vetch exhibited poor performance at the Red bluff site. It did produce 13% ground cover by the end of the second year, which was not enough to control Medusahead.

'Lana' vetch showed excellent performance during the first year at the Jackson site. During the first year the 16 PLS pounds per acre rate had a 83.3 % average ground cover and the 20 PLS pounds per acre rate produced an 87.5 % average ground cover. 'Lana' vetch was successful during its first year of establishment and growth in controlling Medusahead. During the second year of evaluations there was a dramatic drop in the 'Lana' vetch ground cover that resulted in a lack of control of Madusahead. This decline was due to phosphate fertilizer not being applied the second year (1).

CONCLUSION

Where 'Lana' vetch is well adapted, it may be successfully broadcast seeded and used to control Medusahead in combination with applications of phosphate fertilizer. Phosphate fertilizer must be applied each year to maintain a high level of Lana vetch ground cover (1). The optimum seeding rate for Lana vetch is 20 PLS pounds per acre.

Table 1. Evaluation of 'Lana' vetch by treatments

Location	Treatment (PLS #/acre)	Average % Cover (2000)	Average % Cover (2001)
Red Bluff	12	3.3	5.0
	16	2.7	13.3
	20	3.0	8.3
Jackson	12	45.0	21.7
	16	83.3	20.0
	20	87.5	11.7

REFERENCES

1) Lana Vetch for Medusahead Control, Robert S. MacLauchlan, Journal of Range Management, Vol. 23, No 5, September 1970, pp. 351-353.

Air	CTA	60%	Buffers
Animals	EQIP	30%	Native Species
Human	WHIP	10%	Outreach

Aboriginal Management of Riparian Environments in Central California

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Introduction:

Since submittal of the fellowship proposal in 2002, numerous events have led to the modification of scope and intent of the research that was proposed at that time. Specifically, the following have contributed to the modification of the research:

1) Instead of conducting research solely at the Cache Creek Nature Preserve (CCNP) in Woodland, California, a secondary research site has been secured at the Natural Resource Conservation Service's Plant Material Center (PMC) in Lockeford, California. The addition of this second research site broadens the scope of the work by doubling the number of transects for treatment analysis. Similarly, the two sites provide an opportunity for comparison between geographic locations.
2) A third party public entity not involved in this research objected to the treatments at the PMC research site, causing substantial delay in the final treatment of prescribed burning.
3) With the encouragement of community members and my graduate advisor, the focus of my research is currently evolving from a Master Thesis project toward Ph.D. dissertation research.

Considering the above noted changes to the scope and intent of this research, the goals, objectives, and hypotheses initially stated in my research proposal have been modified to reflect the current status of my research.

To summarize the proposal, the primary objective of this research is to identify the effects of prescribed fire on riparian ecosystems in central California. Specifically, this research will attempt to identify how fire can be used as a tool for resource management and conservation. Additionally, this research will attempt to define the historic and contemporary context for aboriginal land management practices and regimes in riparian ecosystems.

The hypotheses this research will attempt to verify are as follows:

1. Does native plant diversity and/or density increase following treatment (coppicing and burning)?
2. Which season of burn (spring or fall) minimizes adverse effects to native flora and fauna?
3. What is the intensity (temperature) and duration of fire in various vegetation types, and do these parameters vary seasonally?
4. How is fire management from a historic perspective different from fire management in the contemporary?
5. What is the fire history or regime within representative riparian ecosystems in central California?

Preliminary Findings:

Prescribed burns at the CCNP were carried out on November 20 and 27, 2002 respectively, and prescribed burn at the PMC was carried out on December 8, 2002. During these fire events, various observations were made of fire conditions and wildlife activity. The fires were generally low intensity with average flame heights less than 3 feet. Primary fuels ignited were leaf litter and woody fuels less than one inch in diameter along with grasses and forbes. During and after the fire events, community participants observed the activity levels of wildlife within the treated areas. Of the target species (small mammals, reptiles, and amphibians) identified for monitoring effects, no mortality was observed. Wildlife species observed included western fence lizard (*Sceloporous occidentalis*), cottontail rabbits (*Sylvilagus* spp.), and various passerine species. It is worthy to note that during the pre-burn trapping, only young of the year *S. occidentalis* were trapped or observed during the fall trapping period. No *S. occidentalis* were trapped at either site after November 5, 2002. However, during the fires at both the CCNP and PMC several adult *S. occidentalis* were observed active within the treated areas. Specifically, adults were observed moving about the charred and actively burning duff. The behavior of these individuals was noted as they burrowed into the warm ash in what appeared to be dust bathing. Similarly, various

unidentified species of spiders were observed active within the burn areas, passing through flaming fronts and emerging on the other side apparently unharmed. Peak avifauna activity was observed within and above the burning area. Based on witness observations, it is presumed that avian activity focused around the foraging of insects, which were also active during the fires. Following the fires at the CCNP, it has been noted that mule deer (*Odocoileus hemionus*) activity increased within the burned areas. Specifically, the burned areas demonstrated an observed increase in tracks and bedding areas in comparison with unburned areas.

As stated in greater detail in the "Research Experience to Date" section below, there were difficulties in igniting the fuels at the PMC site. The observations of fire behavior between the fires at the CCNP and PMC exemplified the role weather conditions can have on fire properties. Fire behavior at both sites largely was regulated by fuel moisture and humidity. Thus, it was helpful to have several community members present to assist in ignition and spread of the fire. The figures below represent fire temperature and duration data collected at the CCNP on November 27, 2002 with an ambient air temperature of approximately 63 ˚ F, wind speed average of less than one mile per hour, and relative humidity of 30 percent.

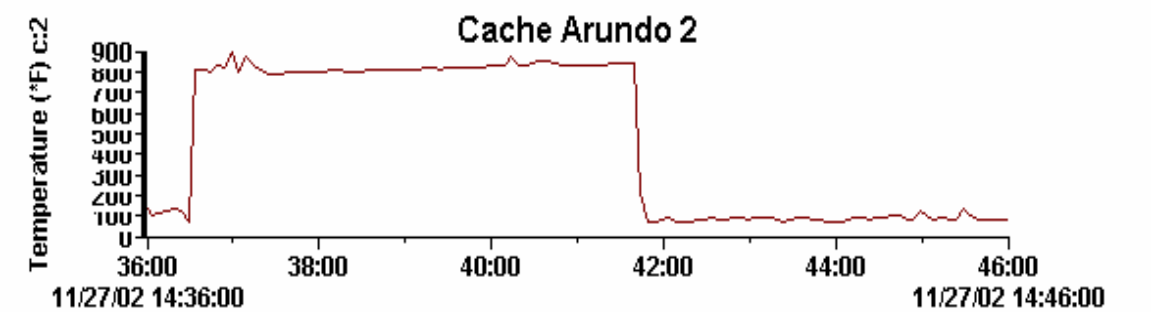


Figure 1. This graph depicts the intensity and duration of fire in *Arundo* wood chip duff. As exemplified by the graph, the fire in this fuel type under the burn conditions reached approximately 800 F and maintained this intensity for approximately five minutes.

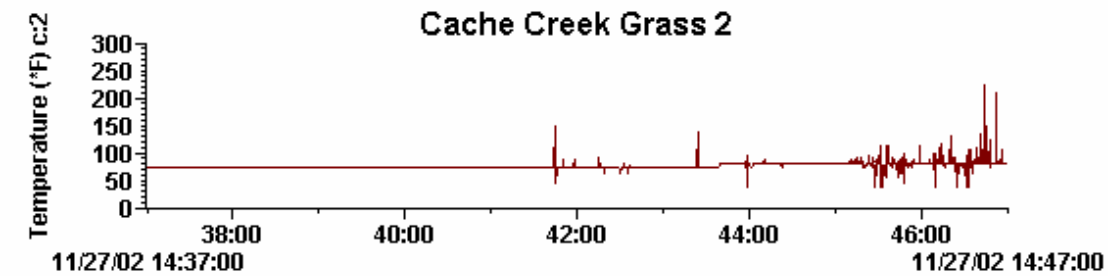


Figure 2. This graph depicts the intensity and duration of fire in a stand of *Carex barbarae*. As exemplified by the graph, the fire in this fuel type under the burn conditions reached approximately 275 F and maintained this intensity for only a few seconds. Additional peaks observed in this graph are likely representative of repeated dousing by the drip torch to test the data logger.

Field Experience to Date:

As indicated in the introduction, the delay in burn treatment at the PMC was initially caused by objections of a third party public entity. Specifically, this entity had been conducting biological monitoring that included stations within the research site at the PMC. Coordination with this entity began approximately one year prior to initiating research at this site. During previous discussions of this research, the entity appeared very supportive of the proposed research. However, as the target date for the burn treatment approached, the entity objected for fear that any burn treatment in the vicinity of their monitoring area might skew the results of their monitoring efforts. Several attempts were made to identify areas where their monitoring might have been affected by this research. However, the staff of the public entity refused to meet to work to a mutually agreeable implementation strategy. In order to maintain peace between the entity, community host, and the research, I delayed the burn treatment until their monitoring season was complete. This automatically meant that the objectives of burn timing following seasonal precipitation would not be met at the PMC. Discussion with community members led to a mutual agreement that we should still attempt to burn this season at the earliest possible date.

This posed another problem with scheduling a burn at the PMC. Specifically, the PMC is within the jurisdiction of the San Joaquin Valley Air Quality Control Board. Regulation of air quality within the San Joaquin Valley is among the most stringent in the United States. Due the season and weather patterns at the desired time of burning, permissible burn days were severely limited. The desired window to burn would have occurred approximately mid-November 2002. However, we were finally granted permission to burn on December 8, 2002. By this date, the PMC had received several inches of precipitation in the form of rain events and dense fog. Thus, many grasses had germinated and the burnable fuels had been dampened considerably. In consideration of the next possible burn day, it was decided to attempt to burn specific areas limited to plots surrounding and including the line transects. Considerable energy was devoted to accomplishing the burn objectives within these relatively small units. Regardless, we were able to achieve treatments within the desired units.

As result of these combined events, the hypotheses were modified to include comparison between fall and spring burning. Thus, this spring four new line transects will be established in the treatment areas at the CCNP and PMC to test seasonal variation in burn treatments.

Successes and Challenges:

Aside from the difficulties previously mentioned, the fieldwork has been quite successful. The CCNP graciously contracted the California Conservation Corps to complete the coppice treatment (i.e., ladder fuel removal) in the treatment area. At the PMC, community volunteers contributed 10 weekends of work to complete the coppice treatment. Since completion of the coppicing and fall burn prescriptions, additional volunteers have offered their assistance for future treatments and research needs.
One of the challenges of this research is coordination and timing of research activities between research sites and participatory communities. Through this process, I have learned the community extends beyond both the Native American and host communities at each research site as represented by recruitment of volunteers from outside of these communities

Lessons Learned Thus Far:

In any research, there must be room for modification of the applied research. I was not anticipating any difficulty in meeting my research objectives this season. However, the obstacles encountered have caused me to reconsider alternatives with the community and devise additional hypotheses that are believed to strengthen the value of this research. Essentially, the lesson is to maintain an open mind and be willing to deviate from the desired path of research when absolutely necessary.

Future Research Directions:

At present, multiple opportunities exist for this research to expand into new research sites and new research communities. Specifically, there has been some interest in furthering this research by investigating the role of fire in the conservation needs of the federally endangered riparian brush rabbit (*Sylvilagus bachmani riparius*). Specifically, species experts have expressed an interest in researching the effects of fire on the riparian brush rabbit. An unpublished report by Close and Williams[1] specifies the need to research the role of fire as a conservation tool for the riparian brush rabbit, and also cites the role of the California Indian Basketweavers Association (CIBA) as an integral partner in conducting this research. This is research of interest to several community members and myself due to our resource conservation objectives and involvement with CIBA. Additionally, I have learned of similar research efforts in northern Australia among Aboriginal groups in Kakadu National Park. Preliminary research into fire and Aboriginal practices and policies in Australia demonstrates numerous avenues for comparative community participatory research. Largely, I see the potential research in Australia as an opportunity to study the continuity of continued Aboriginal land management practices as well as how policy within the region could serve as a model for how things might be improved in California. I have been offered the opportunity to pursue these options of broadening my research, however, further consideration is required to determine the practicality and feasibility of either of these options. Certainly both are of interest to me, and provide an interesting situation to diversify the participant pool into a larger research project.

[1] Close, C.L. and D.F. Williams. date unknown. *Habitat Management for Riparian Brush Rabbits and Woodrats With Special Attention to Fire and Flood*. http://arnica.csustan.edu/esrpp/caswell_sum.htm

Study Number 06C0012Z Evaluation of Perla grass for carbon levels and potential for biomass-to-ethanol and global climate change

Study Determine Perla carbon levels. UC Davis will do data analysis and results will be stated when this task is completed.

Purpose	Technology Development	**Species**	1
Funding:	NRCS	**Native**	0
Duration	2000 - 2005	**Accessions**	1
National	Rangeland 1.1	**Accessions**	0
Status	Active	**Plots:**	9
Type:	Advanced	**Evaluations**	0
Evaluated:	N		

SWAPA+H:	**NRCS**		**Resource**
Air	CRP	20%	Buffers
Human	CTA	20%	Carbon Sequestration
	EQIP	10%	Grazing Land Conservation
	GLCI	30%	Soil, Water, and Air Quality - Other
	SP	20%	

SOIL NAME	**Arbuckle**	**Cortina**	**Hillgate**	**Kimball**
SOIL CLASSIFICATION	f-l, superactive thermic Typic Haploxeralfs	l-skel, superact thermic Typic Xerofluvents	fine, smectitic, thermic Typic Palexeralfs	f, active, thermic mollic Palexeralfs
SLOPE CLASS(ES) *	0 - 3 percent	nearly level	0-3 percent, 3-8 percent	0-3 percent, 3-8 percent
GEOMORPHIC POSITION	low terraces	alluvial fans and floodplains	low terraces	fan terraces
VEGETATION	range - annual grasses and forbs	rangeland	rangeland	annual grasses and forbs
DEPTH CLASS	very deep	very deep	very deep	very deep

RESTRICTION?	n/a	n/a	n/a; abrupt text chg to clay @ 19"	> 40" if present
DRAINAGE	well	somewhat excessively drained	moderately well drained	well drained
PERMEABILITY	moderately slow to slow	rapid	very slow and slow	very slow
SURFACE TEXTURE	sandy loam	grv sandy loam	loam	loam or gr loam
PARENT MATERIAL	alluvium from conglomerate/metased	mixed source gravelly alluvium	mixed alluvium	mixed alluvium
DEPTH TO CALCAREOUS?	n/a	n/a	> 38"	n/a
pH @ 20 cm *	6.2	6.4	6.3	5.7
SURF MSTR @ 15 BARS (%) *	4.6	4.2	6.1	4.9
C:N RATIO - SURFACE *	10	9	9	13

SOIL NAME	**Myers**	**Newville**	**Parrish**	**Sehorn**
SOIL CLASSIFICATION	fine, smectitic, thermic Aridic Haploxererts	fine, smectitic, thermic Mollic Palexeralfs	f, vermiculitic, mesic, Ultic Haploxeralfs	f, smect, thermic Aridic Haploxererts
SLOPE CLASS(ES) *	0-3 percent	3 - 10 percent +	10 - 30 percent	10 - 30 percent
GEOMORPHIC POSITION	basins	dissected terraces	uplands	uplands
VEGETATION		annual grass range	brushy range	range
DEPTH CLASS	very deep	moderately deep	moderately deep	moderately deep
RESTRICTION?	n/a	26"	26"	29"
DRAINAGE	well drained	well drained	well drained	well drained
PERMEABILITY	slow	slow	moderately slow to slow	slow
SURFACE TEXTURE	clay	gr loam	gr loam	clay loam
PARENT MATERIAL	mixed alluvium	softly consolidated alluvium	resid of Franciscan sed/metased	residuum from calc sand/shales
DEPTH TO CALCAREOUS?	25" +	n/a	n/a	25" +
pH @ 20 cm *	n/a	n/a	5.7	6.9
SURF MSTR @ 15 BARS (%) *	n/a	7.2	12	19.1
C:N RATIO - SURFACE *	n/a	10	20	10

SOIL NAME	Tehama	Zamora
SOIL CLASSIFICATION	f-s, mixed, thermic, Typic Haploxeralfs	f-s, mixed, thermic, Mollic Haploxeralfs
SLOPE CLASS(ES) *	0-3 percent, 3-8 percent	0-3 percent
GEOMORPHIC POSITION	fans and terraces	fans and terraces
VEGETATION	dry farmed crops	annual grasses/forbs, occas oaks
DEPTH CLASS	deep to very deep	deep
RESTRICTION?	n/a	n/a
DRAINAGE	well drained	well drained
PERMEABILITY	slow	moderately slow
SURFACE TEXTURE	silt loam	silt loam
PARENT MATERIAL	mixed alluvium	mixed alluvium
DEPTH TO CALCAREOUS?	n/a	51"
pH @ 20 cm *	6.5	7
SURF MSTR @ 15 BARS (%) *	5	11
C:N RATIO - SURFACE *	10	12

* - Soil Survey Tehama County, CA (1967). Data may be extrapolated from geographically similar soils.

All other data from OSD

One square foot samples of biomass was sampled and weighed on a digital scale. No new Perla planting biomass will be sampled until it is established.

Table 1. Biomass Data

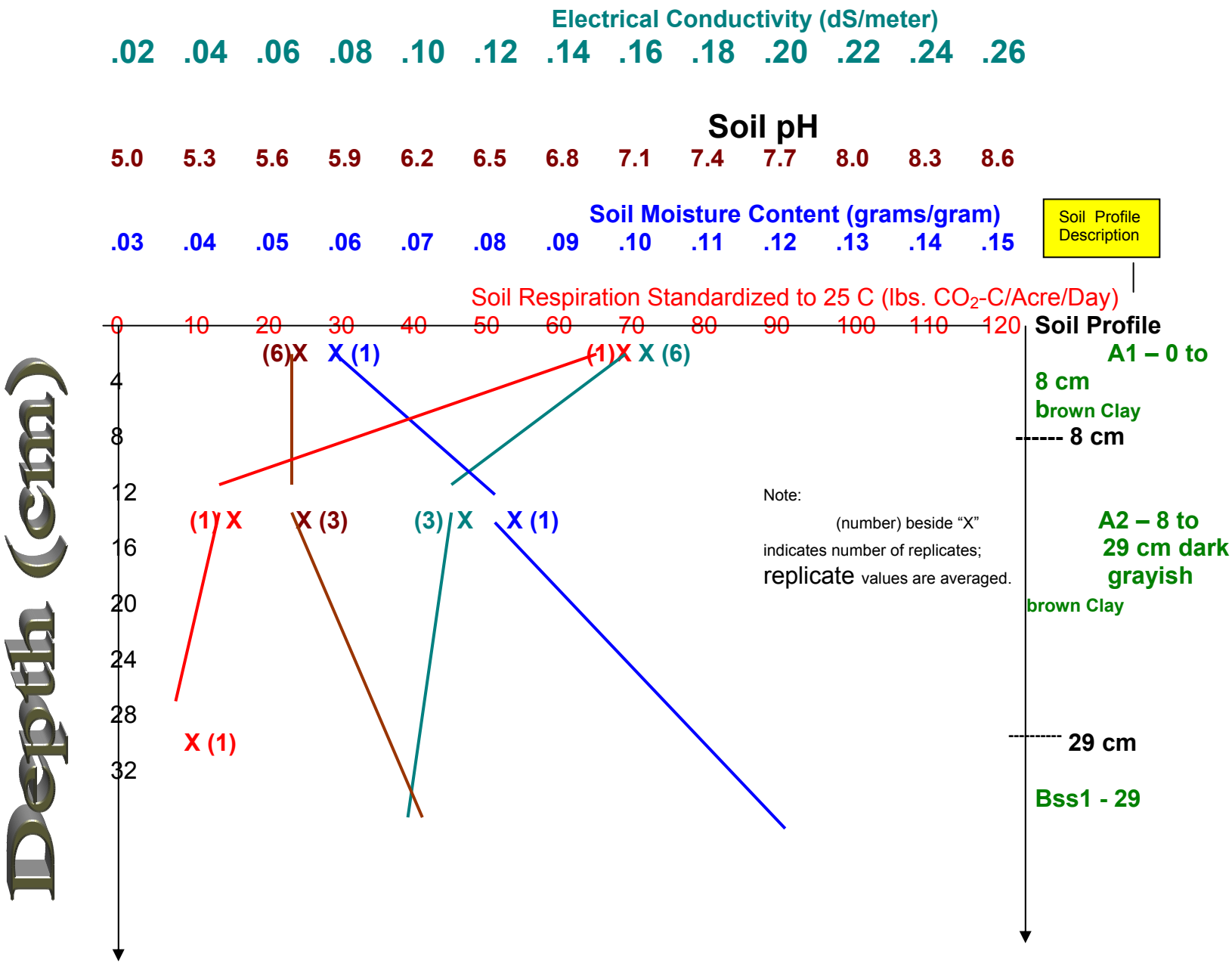
	Old Perla	Annual Range	New Perla
Sample 1 weight (grams/ft2)	56.4	16.6	Not sampled
Sample 2 weight (grams/ft^2)	57.7	24.2	Not sampled
Sample 3 weight (grams/ft^2)	51.9	25.2	Not sampled
Average weight (grams/ft^2)	55.33	22.0	N/A
Average Pounds per Acre	5,309	2,111	N/A

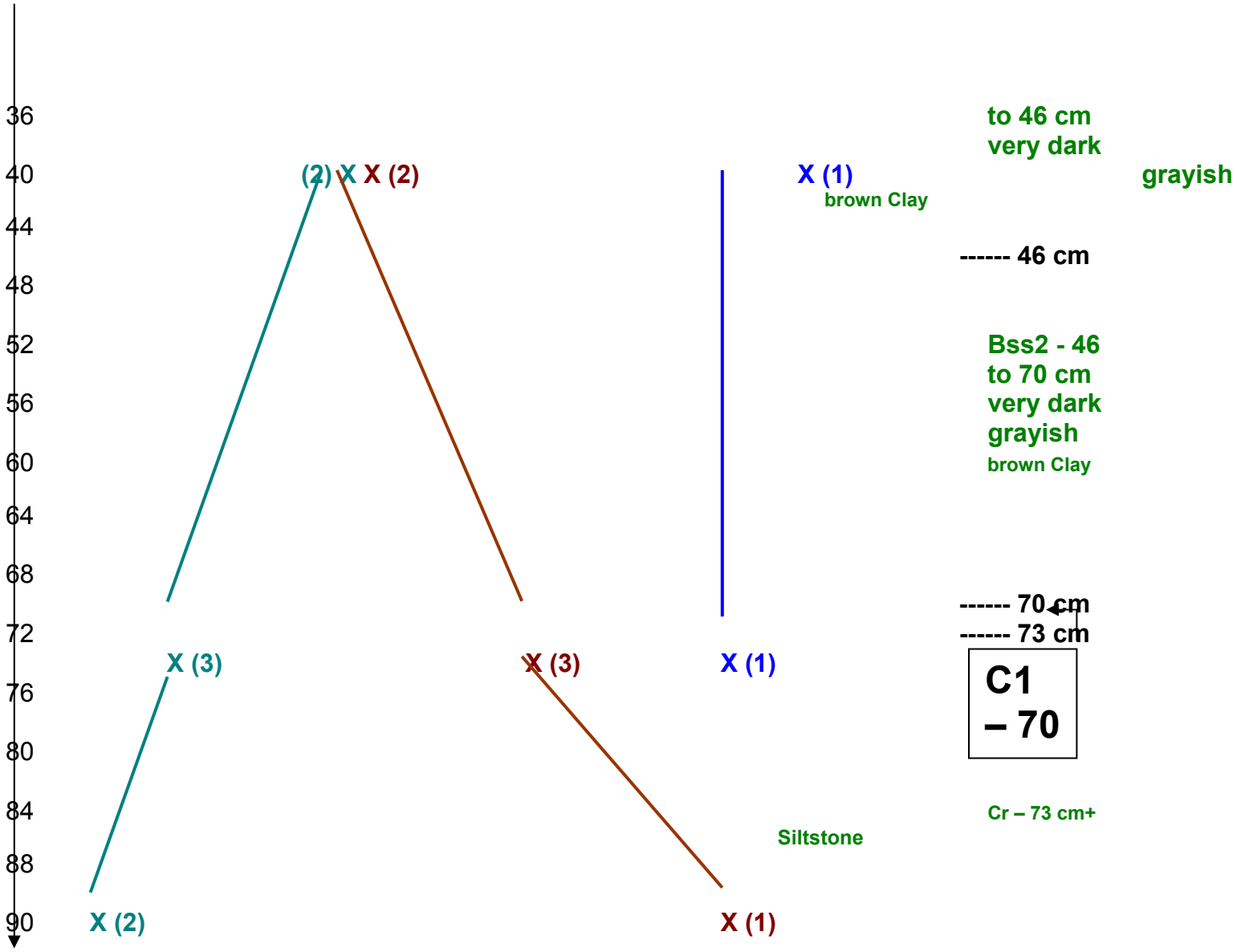
Roots were sifted from one square foot soil for each soil sampling depth and weighed on a digital scale for the 11-year old Perla and annual range grasses. No new Perla planting roots will be sampled until it is established.

Table 2. Root Data

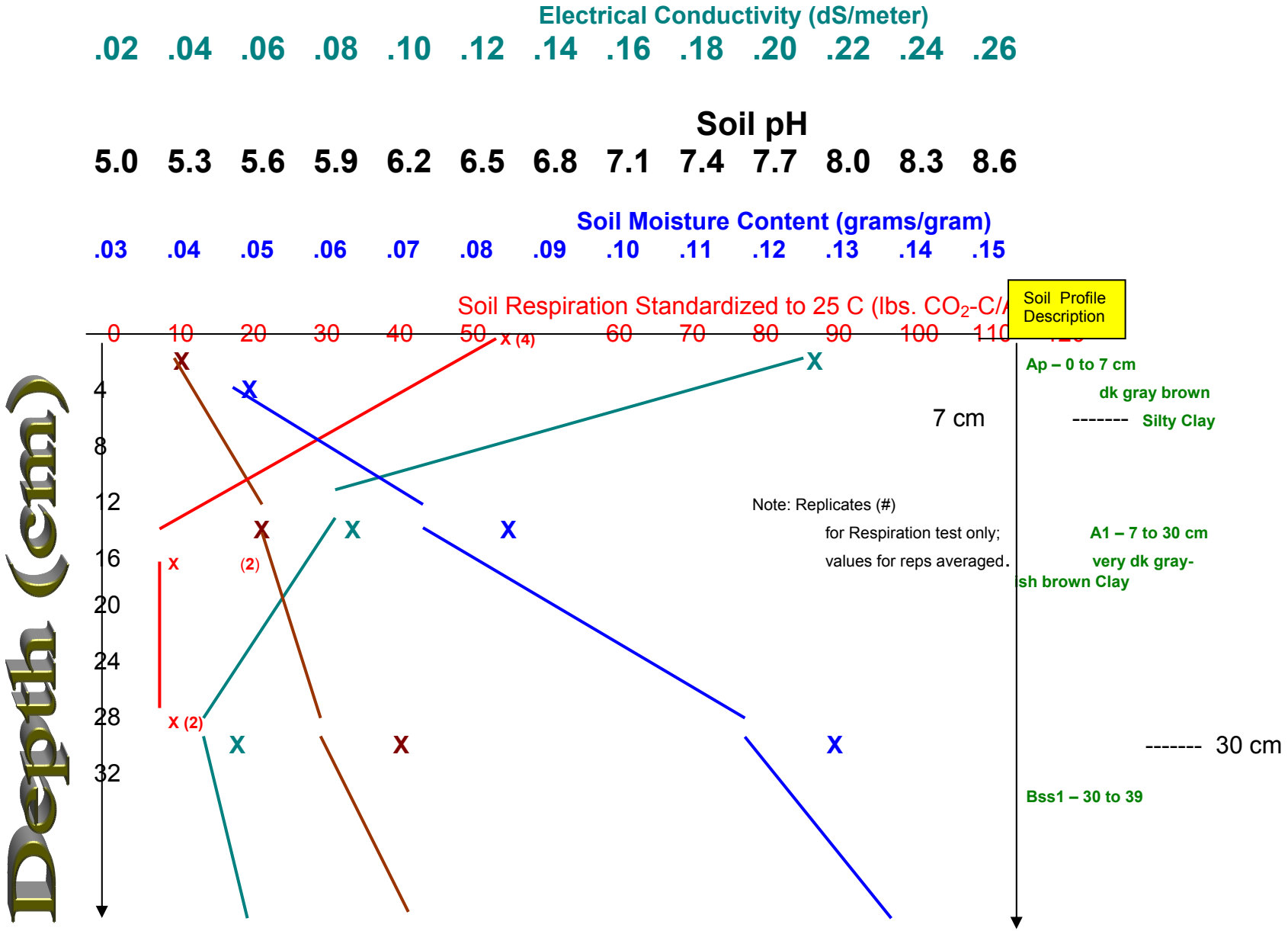
	Old Perla	Annual Range	New Perla
0 – 5 cm (grams/ft^2)	218.4	6.6	Not sampled
5 – 15 cm (grams/ft^2)	12.8	0.2	Not sampled
15 – 65 cm (grams/ft^2)	41.5	Not measurable	Not sampled
65 – 86 cm (grams/ft^2)	19.6	Not measurable	Not sampled
85 – 100 cm (grams/ft^2)	2.8	Not measurable	Not sampled
Profile Total (grams/ft^2)	295.1	6.2	N/A
Pounds / Acre (0 – 100 cm)	28,314	652.44	N/A

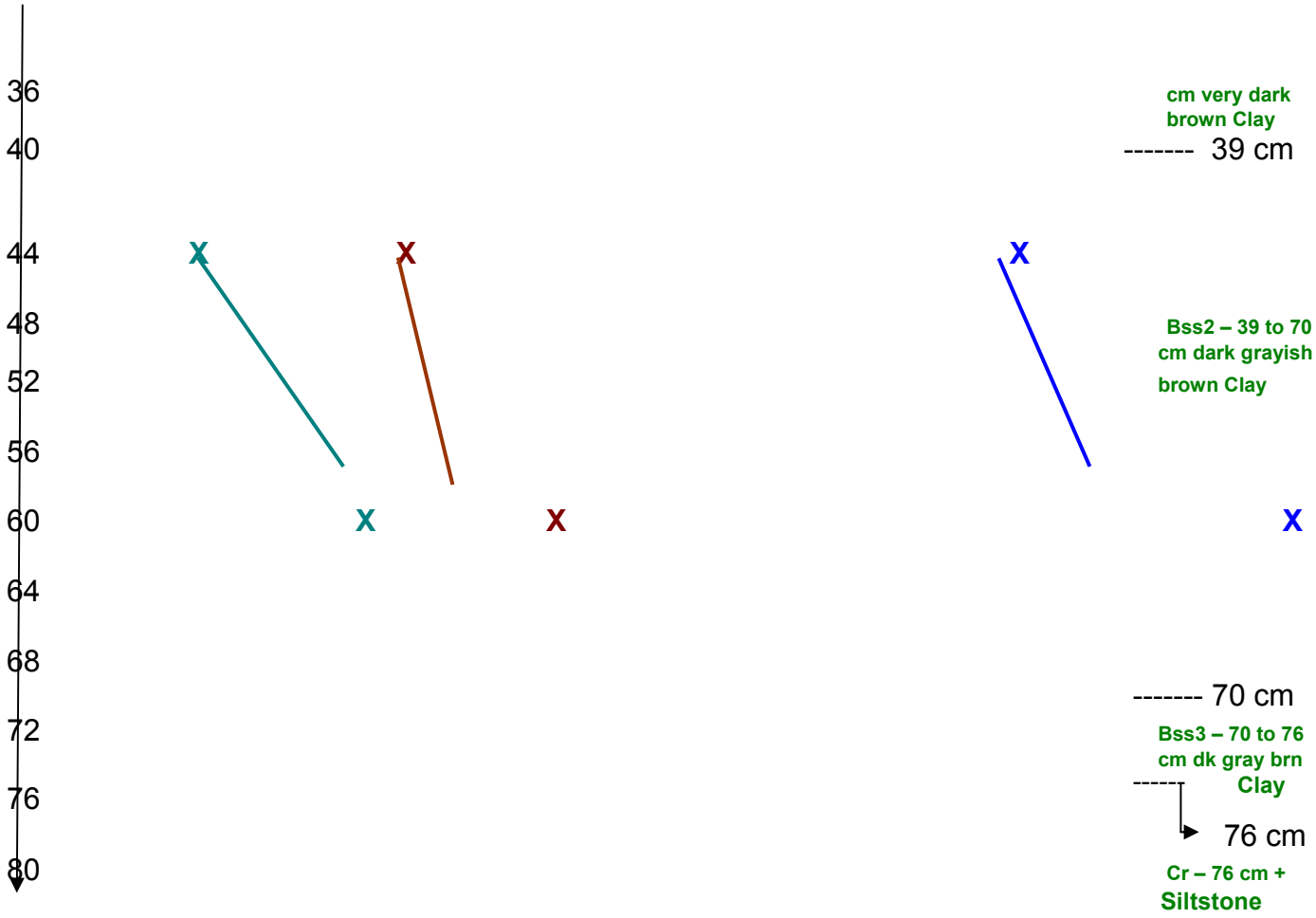
Pit 1. Yolo Conservation Field Trial, Yolo L&C Annual Range, Year 2001 Data



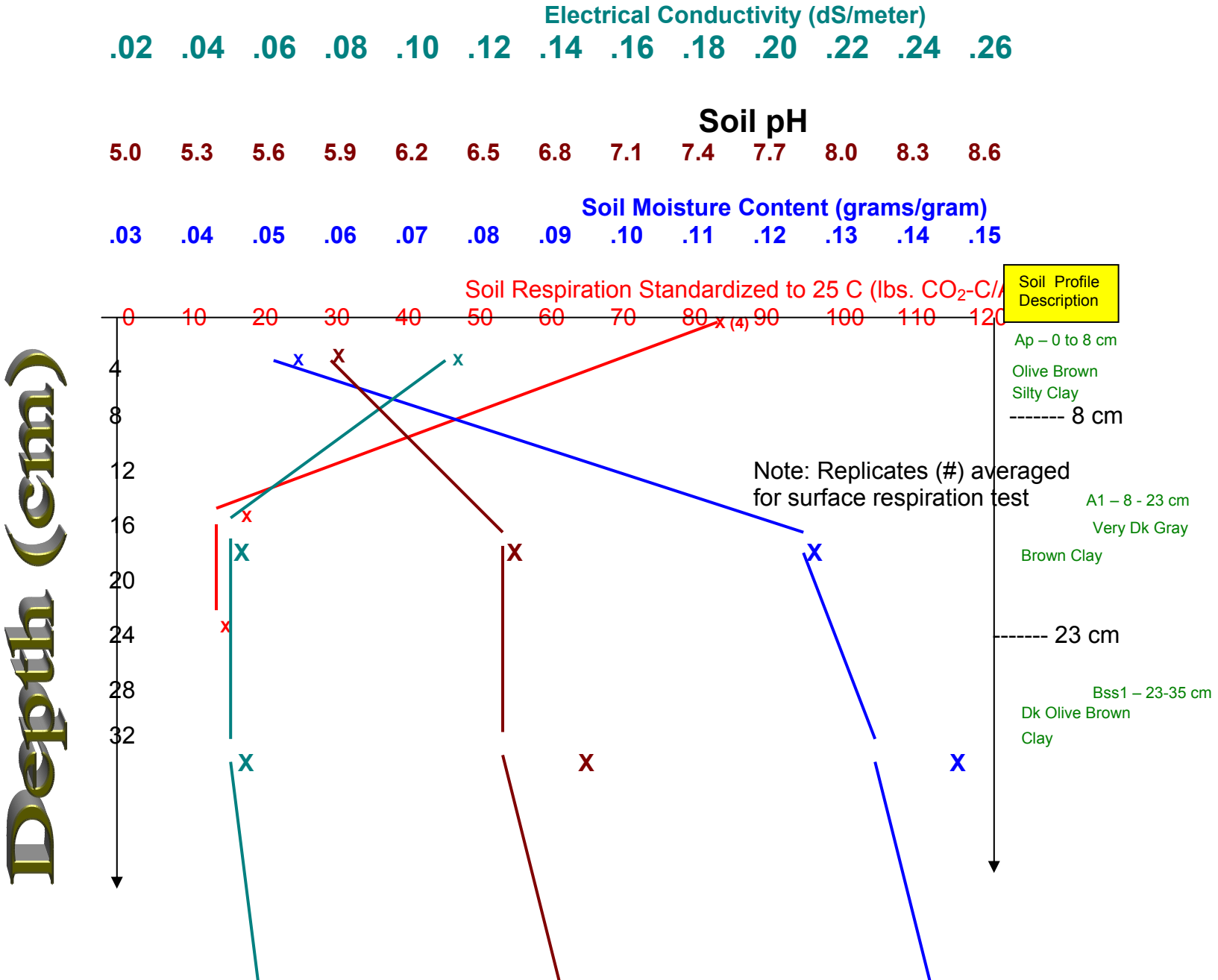

36
40
44
48
52
56
60
64
68
72
76
80
84
88
90
(2) X X (2)
X (1)
brown Clay
to 46 cm
very dark
grayish
------ 46 cm
Bss2 - 46
to 70 cm
very dark
grayish
brown Clay
X (3)
X (3)
X (1)
------ 70 cm
------ 73 cm
C1
– 70
Cr – 73 cm+
Siltstone
X (2)
X (1)

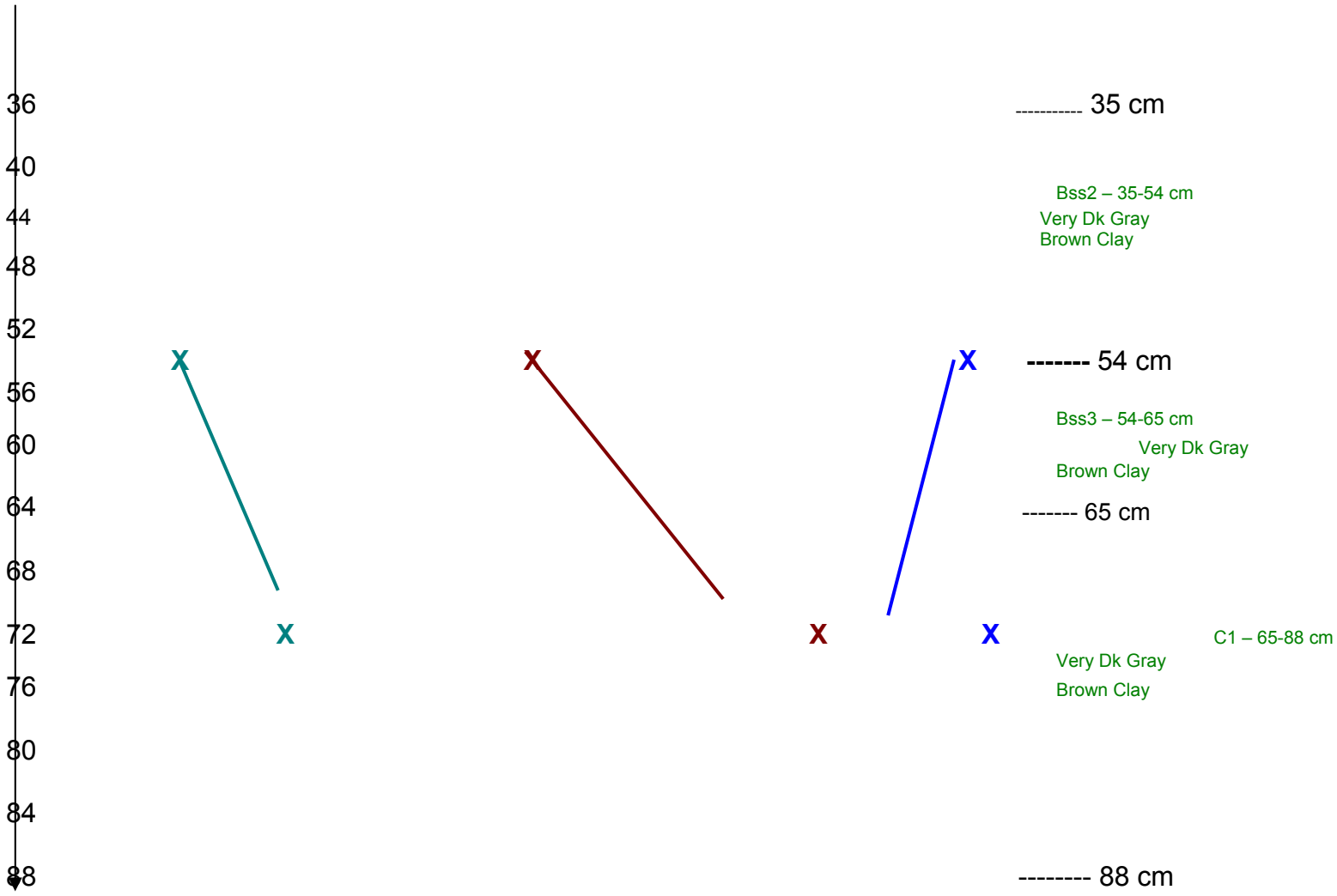
Pit 2. Yolo Conservation Field Trial, Pete's Valley Perennial Range, Year 2001 Data




36
40
44
48
52
56
60
64
68
72
76
80
cm very dark
brown Clay
------- 39 cm
Bss2 – 39 to 70
cm dark grayish
brown Clay
------- 70 cm
Bss3 – 70 to 76
cm dk gray brn
Clay
76 cm
Cr – 76 cm +
Siltstone

Pit 3. Yolo Conservation Field Trial, Yolo L&C Perennial Range, Year 2001 Data




36
40
44
48
52
56
60
64
68
72
76
80
84
88
---------- 35 cm
Bss2 – 35-54 cm
Very Dk Gray
Brown Clay
------- 54 cm
Bss3 – 54-65 cm
Very Dk Gray
Brown Clay
------- 65 cm
C1 – 65-88 cm
Very Dk Gray
Brown Clay
-------- 88 cm

Bio-mass eucalyptus clone selections study

Study Select best clone for bio-mass use. Eucalyptus Improvement association is the project leader with four sites in California. EIA has data collection and analysis lead and they will make final selections. EIA has had a very low level of activity in recent years and has collected no data in the past five years. EIA has been requested to complete this study. No action to date.

Purpose	Release	**Species**	1
Funding:	Other	**Native**	0
Duration	1991 - 2002	**Accessions**	30
National	Forestland 1.1	**Accessions**	0
Status	Active	**Plots:**	120
Type:	Initial	**Evaluations**	0
Evaluated:	N		

SWAPA+H:	NRCS		Resource
Air	CTA	40%	Buffers
Human	FIP	20%	Carbon Sequestration
Plants	UR	20%	Soil, Water, and Air Quality - Other

Eucalyptus evaluation for windbreak use study.

Study Release improved windbreak tree. One selection has been made and the development of a release notice is in progress. No new data has been collected in the past year.

Purpose	Release	**Species**	45
Funding:	NRCS	**Native**	0
Duration	1982 - 2001	**Accessions**	52
National	Cropland 3.1	**Accessions**	2
Status	Active	**Plots:**	52
Type:	Initial	**Evaluations**	1

Evaluated: Y

SWAPA+H:	NRCS		Resource
Air	CTA	40%	Buffers
Animals	EQIP	30%	Carbon Sequestration
Human	UR	30%	Soil erosion and sediment control - Agriculture
Soil			Soil, Water, and Air Quality - Other

Evaluation of saltgrass study

Study Release developed.

Purpose Release
Funding: Other
Duration 1981 - 2001
National Water Quality 3.1
Status Completed
Type: Advanced
Species 1
Native 1
Accessions 40
Accessions 1
Plots: 40
Evaluations 1

Evaluated: Y

SWAPA+H:	NRCS		Resource
Animals	CTA	20%	Buffers
Plants	EWP	20%	Invasive species
Soil	UR	10%	Native Species
Water	WHIP	10%	Riparian
	WQ	20%	Soil erosion and sediment control - Agriculture
			Soil erosion and sediment control - Urban

Application for Selected Reproductive Material Certification

Name/Address of Applicant/Collector

David A. Dyer, Plant Materials Center Manager, USDA Natural Resources Conservation Service, P.O. Box 68, Lockeford, California, 95237
Phone: 209-727-5319; E-mail: Dave.Dyer@ca.usda.gov

A. Genus: Distichlis Species: spicata (L.) Greene
Variety/ssp: Select class LK 517f Germplasm Common Name: Saltgrass

C. Origin of the material.
State: CA County: Tulare Elevation: 246 feet MLRA: 17f
Mean Annual Precipitation: 7 to 10 inches

C. Method of Selection for Selected and Tested Materials. LK 517f saltgrass was sleeted and tested by the USDA Natural Resources Conservation Service under accession number 9032700.

LK 517f saltgrass was collected from a native stand near Pixley, California at an elevation of 246 feet above sea level, (legal description T023S – R24E – S10). Employees of the NRCS (formerly the Soil Conservation Service) originally obtained the plant material on May 31, 1982. It was evaluated in a common garden at Lockford plant materials center against 70 other populations assembled form California. In 1993 six accessions were selected for advanced evaluations. In 1993, a replicated advanced evaluation planting of the six accessions was established near Winters, California. The advanced evaluation site had clay soils and was on the side slopes of an irrigation canal. In October 1994, an evaluation confirmed that accession number 9032700 was superior.

D. Botanical/Objective description of species. LK 517f saltgrass is a Califronia native, perennial, warm season grass with extensive creeping, yellowish, scaly rhizomes forming large colonies. LK 517f is coarse-leafed with an average leaf width of .120 inches; average leaf length of 2.9 inches; average height of 8.0 inches.

M. Evidence for Selected Material supporting identity of the species and

performance characteristics. LK 517f was not bred but selected for its overall performance and uniformity. It has been evaluated for foliage abundance and uniformity, vigor, and resistance to disease and drought.

Summary of performance data of LK517f saltgrass, Distichlis spicata. Randomized block plots with four replications. Evaluation taken October 1994 near Winters, California. F-A = Foliage Abundance, F-U = Foliage Uniformity, V = Vigor, DI = Disease, DR = Drought.

F-A	F-U	V	DI	DR
4	4.5	3	4	4

Rating criteria: 1= excellent, 9 = poor

N. Area of adaptation and primary use of Selected Materials. LK517f saltgrass primary adaptation is to MLRA 17f; However, it is also adapted to MLRA's 16, 18 and all of MLRA 17. Establishment should be in the late spring using rhizomes or plugs planted on one-foot centers. Irrigation water should be applied the first summer to ensure stand establishment. LK517f saltgrass is used for riparian restoration and bank and shoreline stabilization.

O. Procedure for maintaining planting stock. The Lockford PMC will maintain breeders and foundation planting stock.

P. Additional restrictions. None.

Q. Reference specie sample sent with application forms.

R. Site description. The soil found at the collection site is a deep, poorly drained clay with a clay loam substratum. Slope is 0 to 1 percent. There is a perched water table at a depth of 3 to 6 feet. Annual rainfall is 7 to 10 inches.

S. Information to assist field inspectors. Average height 8.0 inches, average leaf width .120 inches, average leaf length 2.9 inches.

T. Literature review. There is a need for an adapted variety of saltgrass for use through out parts of central California for riparian restoration use and for bank and shoreline stabilization. Saltgrass does not grow straight, but sprawls and forms dense mats. It is a perennial California native grass and grows in or near marsh areas. It is a warm season grass, growing from April to November. Saltgrass can be used for forage. Also, it can tolerate both water logging and long periods of drought.

M. Availability of plant material. Rhizomes or plugs will be made available through the Foundation Seed Service, University of California, Davis.

References:

5. Annual Technical Report – Los Lunas Plant Materials Center, 1980.
6. Reduction of Levee Erosion in the Sacramento – San Joaquin Delta, Department of Environmental Horticulture, UC Davis.
7. The Jepson Manual of Higher Plants of California, Hickman, Ed., 1993.
8. Saline Agriculture, International Affairs National Research Council, 1990.
9. Grass, an Identification Guide, Lauren Brown, 1979.

Time Spent on Activities for Lockeford PMC

State = CA

Technology		**Technology**		**Seed/Plant**	
Releases	5 %	**Written:**	10 %	**Foundation:**	20 %
Technology	15 %	**Oral:**	5 %	**Field**	10 %
		Other:	5 %	**Funded Production:**	0 %
Subtotal	20 %	**Subtotal**	20 %	**Subtotal**	30 %

Maintenance and	
Facility or Land	30 %

Afghanistan Cotton Variety Trial

Mazar-e-Sharif Area

The following variety trial was developed by David Dyer USDA-NRCS with peer review input form UC Cooperative Extension Service cotton specialists Dr. Ball, Dr. Hutmacher, Dr. Van Kessel and Dr. Rethwisch. The varieties will be planted with three replications at each location in a RCB design experiment and will be conducted at three one hectare locations in the Mazar-e-Sharif area.

The site conditions are: 3 to 5 inches of rainfall, there is no rain during the summer, hot temperatures up to 122F in summer, there are high winds, irrigation is on an 8 to 12 day cycle, cotton is mainly planted in areas which are most likely to have irrigation water during the summer, irrigation scheduling and amount of water delivered is a problem in the summer months, seed bed preparation is by wooden plow then shovel work to form the raised seed bed and irrigation furrow and seed is planted on both sides of the bed, sicl soil with some ca salts, cotton is hand harvested, boll worm and other worm pests are present, cotton harvests range from 50-350 kg/2,000 sq. m., time of planting is in late March into April and harvest lasts into November, 1 jerib is 2,000 sq. meters with 5 jirebs per hectare, urea is the main source of fertilizer, plant growth regulators are not used, the same varieties have been used for the past thirty years, improved fiber quality is needed.

The trial will take place in two different years on three one hectare sites (three hectares total), (planting March/April 2005 and 2006). Each variety replication would be planted on 133.3 sq. meters, 3 X 133.3 sq. meters = 400 sq. meters at each location, with three locations 3 X 400 = 1200 sq. meters will be planted each year for each variety. If 20 varieties are used in this trial, it will need 20 X 1200 sq. meters = 8,000 sq. meters (4 jeribs) at each location and 24,000 sq. meters (12 jeribs) in total. The planting will be on 38 to 40 inch row spacing with a goal of 35,000 to 55,000 plants per acre. 13 to 15 pounds of seed will be planted per acre for the Acalas (noted below for others) and will be planted at a depth of 1 1/2 inch. 6 pounds of seed of each variety will be needed for each year (2 years X 6 = 12 lbs total ea). 20 varieties X 12 lbs ea = 240 lbs needed.

A limited planting date trial will be planted in small plots at each of the three sites (2,000 sq. meters X 3 sites = 6,000 sq. meters - 3 jeribs). They will be replicated three times, planted at two different dates and include six varieties (#2, 5, 6, 7, and 10 on list). It is important to have bloom periods at different times to determine variety heat sensitivity.

Acalas (upland cotton, Gossypium hirsutum)(4,000 seeds/lbs - planting rate 13 to 15 lbs per acre):

1. SJ-2 CPCSD
2. MAXXA CPCSD
3. NemX CPCSD, root knot nematode resistant
4. ROYALE CPCSD
5. 1517-99 Afghanistan standard NMCI
6. W-1218 NMCI

Non-Acala upland (5500 seeds/lbs):

7. TAMCOT 22 CAB-CS
8. TAMCOT 22 SPHINX
9. TAMCOT 22 FOUNDATION SEED

Pimas (Gossypium barbadense) (3000-3500 seeds/lbs):

10. S7 CPCSD

Add other local Afghanistan varieties as needed.

Publications for CAPMC

Technical Notes

Sharon Benes, CSU Fresno 2004. Review of poster "Biomass production and nutritional value of salt-tolerant forages irrigated with saline-sodic drainage water: field and greenhouse studies". CSU Fresno, Lockeford, CA. CA-69. 8.

Paper Copy to No
Electronic Copy to Yes
Copyrighted?

Other PM Authors:
CAPMS

Subject Category: Saline Sites
Keywords:

Related Studies:		**Related**	**Related Releases:**
SWAPA+H:	**NRCS**		**Resource Concerns:**
Plants	CTA	100%	Water use/water management - Irrigation/Salinity
Soil			
Water			

TECHNICAL NOTES

U.S. Department of Agriculture Natural Resources Conservation Service

TN-PLANT MATERIALS-69 September 2004

Review of poster "Biomass Production & Nutritional Value of Salt-tolerant Forages Irrigated with Saline-sodic Drainage Water: field and greenhouse studies"

Attached is an information poster titled "Biomass production & nutritional value of salt-tolerant forages irrigated with saline-sodic drainage water: field and greenhouse studies". The information in this poster was developed by staff from California State University - Fresno, University of California – Davis, and USDA-ARS – salinity laboratory.

This information poster provides a source of information and background for personnel who are providing forage alternatives to land owners who have high saline-sodic conditions. USDA-NRCS Plant Material Program cultivars 'Jose' tall wheatgrass, 'Rio' beardless wildrye and 'Solado' alkali sacaton were evaluated for forage use; moreover, the information provided documents cultivar performance quantitatively.

Phillip Blake 2004. Review of paper "Napa river flood management project - Willow and cottonwood revegetation". Napa field office, Lockeford, CA. CA-70. 10.

Paper Copy to No
Electronic Copy to Yes
Copyrighted? **Other PM Authors:**
Subject Category: Riparian
Keywords:

Related Studies:		**Related**	**Related Releases:**
SWAPA+H:	**NRCS**		**Resource Concerns:**
Plants	CTA	100%	Riparian
Water			

TECHNICAL NOTES

U.S. Department of Agriculture Natural Resources Conservation Service

TN-PLANT MATERIALS-70 September 2004

Review of paper "Napa River Flood Management Project – Willow and Cottonwood Revegetation"

Attached is a paper titled "Napa River Flood Management Project – Willow and Cottonwood Revegetation". This paper written by the USDA-NRCS Napa CA. field office staff to document the results of experimental plantings. During the project, the field office staff was assisted by field volunteers and Lockeford PMC staff.

This information paper provides a source of information and background for personnel who are working in tidal estuary areas which are being vegetated with willows and cottonwoods.

Prepared by Phillip Blake, District Conservationist, Napa, CA. Reviewed by David A. Dyer, Plant Materials Center Manager, Lockeford, CA.

CA-70-1

Napa River Flood Management Project

Experimental Plantings to Determine Minimum Planting Elevations In The Napa River Estuary

Willow and Cottonwood Revegetation

USDA Natural Resources Conservation Service, Napa , CA

May, 2003

PURPOSE

The purpose of this project is to predict minimum viable planting elevations for willows and cottonwood planted as part of the bank revegetation along selected reaches of the Napa River Flood Management Project. Napa Field Office NRCS staff and field volunteers established experimental plantings to assess woody cutting viability. The reveg team also made observations of root crown elevations of existing trees along the Napa River, within the study reach.

BACKGROUND

The Napa River Flood Management Project "Living River" channel widening and restoration project is within the tidal prism, influenced by brackish water tidal conditions. Because native willow and cottonwoods typically exhibit a relative intolerance for saline soils, the brackish tidal waters are expected to limit the minimum elevations at which these species can establish and survive.

Willow and cottonwood are excellent species for revegetating disturbed riparian areas. They typically establish and grow quickly, and develop strong root masses that help stabilize stream banks. They can tolerate inundation and are resilient to relatively strong tractive stream flow forces. Their trunks and branches help slow water velocity near the banks and thus reduce sediment scour and promote sediment deposition. They also provide excellent wildlife habitat and rapid

development of shade for stream temperature moderation. Willows in particular are relatively simple to plant, and provide a low cost alternative to harsher mechanical stabilization methods.

MATERIALS

Three tree species were tested: Arroyo willow (*Salix lasiolepis*), Red willow (*Salix laevigata*), and cottonwood (*Populus fremontii*).

Willow and cottonwood sprigs were harvested from riparian areas nearby to tidal influenced channels, to take advantage of any greater salt tolerance of the local ecotypes. Willow sprigs for Huichica and the river sites were harvested along Huichica Creek near the planting site. Willow for the Napa Sanitation Site was harvested along nearby Fagan Creek. Cottonwood sprigs were harvested from near the Copia and near the Craig sites.

PROCEDURE

Arroyo willow, red willow, and cottonwood sprigs were planted in multiple accessible, tidally influenced locations chosen by NRCS District Conservationist Phill Blake, (see attached site location map). Four locations (Yacht Club, Copia, Craig, and Milliken Inn) are along the Napa River, one (Huichica) on Huichica Creek, and one (Napa Sanitation District) on Selby Creek. See the attached map for site locations. (The Napa Sanitation District site planting was not part of this experiment, but is included for its limited data.) Planting elevations were chosen to straddle the approximate high tide line. Sprigs were planted at three elevations, the lowest near the high tide mark, the middle about 2 vertical feet higher and the highest an additional 2 feet higher.

Sprig size was between 1” to 2” in diameter by approximately three feet long, with a sharpened bottom end. A steel tool bar was used to dig a pilot hole, ideally slightly smaller than the diameter of the sprig. Then the sprig was driven by sledge into the pilot hole, with approximately two feet of the sprig was buried. Effort was made to establish tight soil contact to the buried portion of the sprig. If space was left between the soil and the sprig, effort was made to tamp the soil

tight to the sprig. After any necessary trimming to remove sledge damage, six to twelve inches of the sprig was left exposed above ground.

Tools used were bow saw, loppers, clippers, hatchet, sledge hammer, tool bar, soil probe, GPS receiver, digital camera, measuring tape, and sight level.

Soil salinity samples were taken at each planting location at varying depths (typically depths of 6", 12", 18", or 36") using a soil probe tool.

The planting location elevations were later surveyed relative to National Geodetic Vertical Datum (NGVD) monuments established by the City and County of Napa. Status of plantings were recorded in October 2002

SITE AND SOIL DESCRIPTIONS

Huichica Site: The planting sites were on a moderately steep, partially vegetated cut bank. The soil was sandy loam, silt loam, and silty clay respectively downward from the top of the bank.

Napa Sanitation District Site: The planting sites were on shallow-sloped, thickly vegetated, floodplain/banks of Selby Creek, in salt influenced areas. Soil texture was not characterized.
Yacht Club Site: The planting sites were at two locations (north and south) at the base of and slope of a steep, partially vegetated cut bank. The lowest sprigs were in unvegetated tidal mud. The soil was a loam.

Copia Site: The planting sites were on a moderately steep, partially vegetated bank. The lowest sprigs were in unvegetated tidal mud. The soil was a soft fine sandy loam.

Craig Site: The planting sites were on a steep and eroding bank. The soil was slightly indurated alluvial silt to gravel sized sediments.

Milliken Inn Site: The planting sites were near the moderately steep base of a steep cut bank. The base soil was moderately indurated alluvial sediments; the bank soil contained recent loose sediment deposits.

SOIL SALINITY TESTING

Soil salinity was measured at the planting locations using an electronic EC meter to take electro-conductivity readings in milli-Seimens (mS/cm) on a one-to-one soil/water paste. Soil salinity samples were taken at each planting location at depths of 6", 12", 18", and 36" using a soil probe tool. Soil salinity was measured at the Huichica, Yacht Club, Copia, and Craig sites.

RESULTS

Planting elevations, measured salinity, and other data for Huichica, Yacht Club, Copia, Craig, and Milliken Inn sites are summarized on the table and chart pages for that planting site. Survival and vigor of the plantings were observed and recorded in October 2002, with the assistance of Dave Dyer, NRCS Lockford Plant Materials Center.

Huichica Site

The location observed was willow sprigs planted at multiple elevations along an eroding bank to protect the bank were observed. Of 27 sprigs observed, all had good first growth, but suffered from drought or salt later in the dry season. In response to withering leaves, some irrigation was applied in August. Only 4 of the sprigs remained alive in October, with sprouts ranging from 12" to 18" in length. Although there was some apparent salt damage to the leaves, lack of soil moisture appeared to be the limit to viability.

Napa Sanitation District Site

Willow sprigs were planted in February 2002 at multiple locations. Very few (less than 5%) grew or survived. It is not known whether the late planting date, salt toxicity, or rodent damage was the limiting factor. No planting elevations have been surveyed or soil salinity measured.

Yacht Club Site

"North site" – no growth was seen on any of the 20 sprigs; the lower elevation row of sprigs was gone. "South site" – former growth was seen on two of the 9 sprigs found, with sprouts had reached 18" in length, although these were dead when observed. The lower sprigs may have been disturbed or removed by fishermen that frequently use the site.

There were no adjacent native trees to survey root crown elevations.

Copia Site

The upper row had 8" of dead growth on the red willow, 24" of live growth on the arroyo willow, and no growth on the cottonwood. The middle row had 36" partly live growth on the red willow, 24" of dead growth on the arroyo willow, and no growth on the cottonwood. The lower row had no growth.

Adjacent willow root crowns were surveyed from an elevation of 4.2 to 5.3 feet, and cottonwoods were surveyed between elevations of 4.2 and 9.4 feet NGVD.

Craig Site

This site has not yet been observed for sprig survival.

Adjacent cottonwood root crowns were surveyed from an elevation of 5.0 to 6.4 feet NGVD.

Milliken Inn Site

This site has not yet been surveyed for sprig and root crown elevations or observed for sprig survival.

No clear relationship between measured soil salinity and sprig survival is apparent from the current data. Soil salinity was sampled during the winter rainy season when more soil water may be supplied from rainfall than from tidal wetting, as may be the case during the summer dry season. Soil salinity may thus be increased during the summer, during the sprig growth season.

RECOMMENDED FUTURE ACTIONS

1. Survey the Milliken Inn Site elevations and measure soil salinities.

2. Monitor soil salinities at one or more planting locations over a year to document possible seasonal changes in soil salinity.

3. Continue to monitor second-year survival of existing plantings.

4. Measure elevations and soil salinities at Napa Sanitation District experimental willow planting sites.

5. Past plantings have been in locations with steep or constructed banks. Establish additional plantings in areas with more gently sloping banks that may better approximate the proposed Napa River Flood Control Project planting locations.

6. Based on the low first-year survivability of previous plantings, establish additional plantings at slightly higher elevations to better assess long-term survivability. (The 4-foot approximate minimum surveyed elevations of existing willow and cottonwood root crowns suggests that this elevation may be the minimum viable.

7. Correlate NGVD elevations with tidal elevations for the sites, if needed.

8. Collect coastal selections of native willows with greater potential tolerance for saline soils/ brackish water. Establish in existing plots and monitor for comparison on survival rates.

Images of Study Plots:

Willow cutting being driven into streambank at Huichica Creek

Yacht Club willow plot. Cuttings on top of bank are ready to plant.

Plant Materials Progress Report of Activities

D.Dyer 2004. Lockeford PMC progress report of activities. Lockeford, Ca, Lockeford CA. 2003. 5.

Paper Copy to No
Electronic Copy to No
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Other PM Authors:
Subject Category: Native Species Issues
Keywords:

Related Studies:	Related	Related Releases:
06C0009H		

SWAPA+H:	NRCS		Resource Concerns:
Air	EQIP	50%	Buffers
Animals	GLCI	50%	Carbon Sequestration
Plants			Grazing Land Conservation
Soil			Invasive Species
			Native Species
			Restoration of Disturbed Areas

PMC Annual Technical Report

D. Dyer 2004. Annual technical report. Lockeford PMC, Lockeford. 2003. 80.

Paper Copy to No
Electronic Copy to Yes
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Other PM Authors:
Subject Category: Biofuel
Keywords:

Related Studies:	Related	Related Releases:
0610003M		
06C0003A		
06C0009H		
06C0011Z		

CAPMC-T-0213-CP

SWAPA+H:	NRCS		Resource Concerns:
Air	EQIP	50%	Buffers
Plants	GLCI	50%	Carbon Sequestration
Soil			Grazing Land Conservation
Water			Invasive Species
			Native Species
			Restoration of Disturbed Areas

Poster

D.Dyer 2003. Lockeford PMC Poster. Lockeford PMC, Lockeford, Ca. 10-15-2003. 1.

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Subject Category: Native Species Issues
Keywords:

Related Studies:	Related	Related Releases:
0610003M		
0610008B		
06C0003A		
06C0009H		

SWAPA+H:	NRCS		Resource Concerns:
Air	EQIP	30%	Buffers
Animals	EWP	30%	Carbon Sequestration
Human	GLCI	30%	Grazing Land Conservation
Plants	WHIP	10%	Invasive Species
Water			Native Species
			Restoration of Disturbed Areas
			Wildlife Habitat

TECHNICAL NOTES

U.S. Department of Agriculture Natural Resources Conservation Service

TN-PLANT MATERIALS-68 September 2004

Guidelines for Native Plant Use

The purpose of this document is to provide guidelines to NRCS planners on recommending native plant materials. A major concern in any restoration or revegetation project is the objective of the planting. If erosion control is a prime concern, the most effective plant to control erosion (native or non-native) should be listed as an alternative to the landowner or decision maker (Bishop, TN-39, 1995). Planners are advised to review the introduction to the MLRA 17 Vegetative Guide (pp. 1-10) for planting guidelines, the Native Plant Policy (Part 406, Ecosystem-Based Assistance, CA406.3) and plant materials technical note 46 – Glossary of Terms For Use On Native Species Issues. Under the CA406.3 policy, native plants not listed in the Vegetative Guide may be suggested by a Field Office, but they must include the NRCS disclaimer:

> *"The attached list of native species is to be considered for general use only.*
> *The Natural Resources Conservation Service does not imply or consent to*
> *the use of this information as a recommendation for species selection.*
> *Plant establishment success is not implied."*

In regards to interim native plant alternatives, the policy also requires the Field Office to evaluate native plants not in the vegetative guide as field plantings so that recommendation status in the future may be considered.

More natives have been added to the Vegetative Guide revision (MLRA 17 is completed at this time and all MLRA vegetative guides are being placed in an ACCESS database). Criteria for selection included: adaptability, hardiness, availability, ease in establishing, values for wildlife and for meeting conservation objectives. Also considered was the level of field testing of available plant stock. The most recent native cultivars released from NRCS Plant Materials Centers (PMC) have been included.

Prepared by Ann Francis, Landscape Ecologist, Alturas, CA. and David A. Dyer, Manager, Lockeford Plant Materials Center, Lockeford, CA. Reviewed by: Diane Holcomb, State Resource Conservationist, Davis, CA.; Tish Espinosa, Plant Resource Specialist, Lockeford, CA. and John Gustafson, State Range Conservationist, Davis, CA.

Planners are encouraged to recommend PMC native cultivars, where appropriate, in terms of geographic suitability to the project site. Be aware that prior field testing does not guarantee a successful planting. However, the closer the project site conditions resemble field-test conditions, the higher the likelihood of success. The more adaptable a species is, the broader its utility will be (Bishop, TN-40, 1996; TN-59, 2000 and Dyer, TN-64, 2001).

Other native species which are widely available at nurseries, but for which cultivars are not yet developed, have been included in the Vegetative Guide. These species will be identified with the footnote, “Use locally-adapted varieties”. The species, not any one individual ecotype or cultivar, was evaluated using the same quality criteria listed above. Although such plants aren’t official cultivars, they usually come from stock populations utilized year after year by nurseries due to their reliability of propagation. This represents some level of “field-trial” research that could form the basis of future cultivar development, and reduces some of the risk factor in the long term. Using the field planting program to evaluate these species is not required because they are in the vegetative guide, but is a good way to gain additional information (Slayback, TN-35, 1994).

Although wild seed collections are appropriate from a local adaptation standpoint, they are generally riskier and require more lead time. The risk factor is different depending on the type of plant and method of propagation. Wild collections of native grasses, graminoids and some forbs are often challenging to obtain and cultivate successfully, especially the first time, due to variances in seed production, germination, general viability and other factors. Native shrubs and trees are

generally easier to propagate, making on-site collections of cuttings to be grown out by nurseries a very viable option. Seed collectors and nurseries are becoming increasingly experienced in dealing with wild collections. It is best to call several nurseries, ask if they have experience with the native species desired, and then determine the best and most feasible methods of propagation.

With the new Vegetative Guide revision, more species-specific information has been added through the use of footnotes. In addition to nurseries, planners are encouraged to consult other sources of information such as the PLANTS database (http://plants.usda.gov) , Plant Materials Centers (http://Plant-Materials.nrcs.gov/), the FEIS database (www.fs.fed.us/database/feis), Calflora (www.calflora.org/) and other sources.

Logistics of Native Plantings

Planting designs are constrained by time, money, available equipment, and experience of both the planner and landowner. It should be mentioned that, in some cases, vegetative goals are best achieved through management rather than revegetation. Although a good revegetation plan requires considerable thought and planning, it need not be complicated.
If time is short, consider planting in phases or focusing on weed eradication until the appropriate plant materials are ready for planting. Planting in phases may also be the best approach to establishing the desired species.

Site Evaluation

Natives are appropriate for a variety of conservation practices from field borders and hedgerows to revegetating stream banks and wetlands. As in all plantings, a thorough site evaluation is necessary prior to developing a plan. This includes an inventory of existing plants, in addition to determining soil type and soil limitations, available precipitation, temperature (max/min, averages), aspect and hydrology. The evaluation also requires that a clear determination be made in regards to the intended primary use of the seeding. Presence and extent of any noxious weed populations should also be assessed, including the presence and amount of weed seed in the top soil after seed bed preparation (Dyer, TN-36, 1995). Any existing native vegetation to be conserved should be delineated. In addition to reducing the number of plants

needed, it could provide propagative source material, in the form of seed, cuttings or transplants. All the site evaluation information should be considered along with landowner goals and objectives to develop the plan.

Plant Selection & Procurement

It is common to plan for and list on a one to three year schedule the action items and dates to collect, grow or otherwise obtain appropriate plant materials and establish the plants. Obtaining plant material is often the greatest obstacle to using native plants and seed, especially where there are no local nurseries or seed companies. However, the nearest vendors are likely to have some appropriate material. Planners should assist landowners in starting this process as soon as possible into the project. Many resources are available to assist planners with selection of species (Bishop, TN-40, 1995). Planners should match values of plant species with conservation goals. Compile a long list of possible species since some may not be available. Nursery sources can be obtained on the Internet. The California Dept. of Conservation publishes a list of Nursery Sources for California Native Plants that is updated periodically (Showers, 1999). Plant Materials Centers, UC Extension, and County Agricultural Officers may also be able to refer landowners to sources for plants.

When buying seed or plants from a nursery that are already grown out, it is best to inquire the origin of the parent stock or population where collected. At a minimum, try to match the elevation, latitude and climate of nursery stock with the project site (Dyer, TN-64, 2001). Consider also the micro-environment such as aspect, light, soil type and plant associations (Knapp and Rice, 1994). Species can adapt to disturbance, so for revegetating highly-disturbed sites, select species adapted to harsh conditions, or ones that compete well with non-natives (Knapp and Rice, 1994 and Bishop, TN-37, 1994).

The best method for using transplants is to harvest clumps and then have a nursery divide and grow them into smaller-sized, rooted plugs (Owens and Dyer, TN-42, 1996). This is an excellent way to deal with the low seed production typical of many native populations, while still using locally-adapted stock. The salvage of native sod for wetland restoration has been shown to be effective (Owens, TN-43, 1996). Also, the transplanting of willow clumps for stream restoration has shown to be effective (Owens, TN-44, 1996). Transplants colonize an area more quickly and densely than starting from seed. Again, nurseries should be consulted to determine the amount of lead-time needed to produce rooted plugs. Cool-season grasses, for example, require approximately 6 to 10 weeks to

grow (Anderson, 1999). If the grasses are propagated in small containers or small cells in flats, they quickly become root bound, should not be stored and need to be planted immediately.

Contracted collectors need a minimum of 6 months to a year of lead time. The time must be added to the time needed to grow the seed or cuttings out into plants. It is extremely important for collectors to have experience, to know when and what they are harvesting. Testing for percent germination and purity of any wild seed collections is highly recommended (Slayback, TN-34, 1994). Wild seed collections will probably not occur for NRCS funded projects, but could be recommended when assisting RCDs with grant-funded projects. Refer to sources such as Knapp and Rice (1994) for more guidance.

When a major difference in climate exists between the nursery and project site, plants should be hardened off in the destination location for a brief time (2 weeks minimum to 1 month or more) before planting. Nursery-grown plants are usually given regular fertilizer treatments, so it's best to eliminate them and simply water during the hardening-off period. Inquire with nurseries as to the best location and conditions for plants during the hardening-off period.

Plant Size

Planners should consider establishment goals, competition from other species, availability of water, and cost in determining what size plant is most suitable. Placing orders with nurseries as soon as possible will help ensure delivery of the sizes and quantities desired. Growth rates vary with species, but in general a minimum of one year is required for a very small plant, but preferably two is necessary to grow woody cuttings to a suitable size. Plugs require a minimum of 6 months to a year depending on the species. Frequently, native plants grown for restoration projects are grown in specialized containers (i.e. treebands, D-pots, treepot-4) that improve survival rate by promoting deep, straight root systems. In general, the depth of these containers is longer than the width, with ridges that encourage straight vertical roots, and an open bottom to induce air pruning of roots.

Site Preparation

The need for site preparation is evaluated similarly for both native and non-native plantings. Non-native species are valued for their ability to establish quickly and compete with weeds, which minimizes the amount of site preparation needed. Many native trees and shrubs can perform equally well to non-natives and not require additional practices to get them established.

Measures such as grading, soil decompaction, soil amendments, drip irrigation, plant protection, mulch, legume inoculation, seed treatment, weed control fabric and weed eradication require more work, lead time and expense, but they dramatically increase the chances for a successful planting. For the less competitive natives, one or more of these measures may be needed, in addition to continued maintenance. In almost all cases, some form of weed removal is necessary prior to and after planting. For native grass seeding to be optimally successful, multiple herbicide treatments should be required a year or longer before and after the seeding. Fertilizer can benefit tree and shrub plantings, but it is not generally recommended for native grass seeding because fast-growing weeds utilize it first and then out-compete the desired species. Provide for follow-up fertilization as needed. Compost, mulch or other organic amendments that improve soil structure and fertility are generally recommended. Protect from damage such as grazing, trampling and traffic during establishment.

Other potential amendments include mycorhizal and microbial inoculants. Mycorhizae are said to enhance plant establishment, increase productivity, reduce transplant shock and the need for fertilizers, lower a plant's water requirement, increase resistance to weed invasion, reduce soil erosion and increase soil aeration and drainage (Peters, 2002). In spite of the perceived benefits, results of plantings incorporating mycorhizae appear mixed (John Anderson and Scott Stewart, Conservaseed, personal communications; Peters, 2002). Some of these sources believe a mycorhizal inoculant isn't critical where soils are basically healthy, but feel they can be helpful in poorer soils. The literature suggests that not adding a mycorhizae inoculant would not necessarily mean a failed planting, but adding it could promote establishment and reduce the amount of maintenance required.

One caveat regarding site preparation measures is that grading, excavating, fertilizer application, and soil erosion can disrupt or destroy existing mycorhizae populations. Given this, minimal soil disturbance and retention of existing topsoil are recommended practices where possible. However, if used in seeded areas, mycorhizae inoculant must be

incorporated into the soil to a depth of six inches to be most effective. In order to decide whether an inoculant is warranted, sampling may be done to detect presence or absence of mycorhizae and estimate quantity. Peters (2002) recommends collecting several samples throughout the growing season and provides guidance and references for lab analysis. Although cost issues could prevent mycorhizal inoculation in most NRCS projects, it may be a useful and feasible tool on severely degraded sites that are small in scale (Dyer, TN-62, 2001).

Planting Guidelines

Planting methods will vary with each project. This document cannot cover the gamut of methods but it provides some tips applicable to most projects. Similarly, general guidelines and logistical concerns are provided in this and the next section for native grass plantings.

NRCS guidelines for planting container plants already exist and are appropriate for native species. It is important to protect new plants from browsing or other damage. A simple chicken wire cage usually suffices. Bending the wire at the top of the cage to close it off discourages browsing, but leave enough space for the growing tips to eventually fill out. Mulch mats, tar paper or landscape fabric placed around the base of the plant reduce the need for weed control the first few seasons. A 6” layer of wood chips on top further suppresses weeds and protects the barrier underneath. This method is effective and relatively inexpensive, especially when you consider that less weed maintenance will be needed. If the plant is previously hardened off and planted at the right time, this method is preferable to plastic plant tubes commonly used, since plants are forced to acclimate and have more space to grow.

Supplemental irrigation should be given to all tree and shrub plantings in areas that aren’t naturally moist until plant roots reach the water table. Native species often need irrigation at first, but are generally more drought-tolerant once established. Supplemental water reduces the time needed for establishing healthy plants. Drip irrigation systems are effective, versatile, and inexpensive. One lesson learned is that secondary tubing off a primary drip line should be avoided because it falls off easily and requires constant maintenance. For best results, put emitters directly into the primary drip line. Where irrigation is not an option, construct a berm around each plant to retain water.

For native grass seedings, the drill-seeding method is preferable because less seed is needed, seed placement is more accurate and seed can be placed without disturbing adjacent vegetation (minimizes erosion). However, drills can’t be

used in steep or rocky terrain. Native grass seed planting depth is shallow and should be no more than 1/8-1/2" depending on the seed size. More seedings are lost due to seeding too deep, than seeding too shallow. When broadcast seeding, ensure that the soil is in a roughened condition and always broadcast onto a fresh seed bed. Be sure to rescarify old, settled seed beds. Obtaining good soil-to-seed contact is critical when broadcast seeding; Moreover, many landowners use a ring roller cultivation packer to obtain soil-to-seed contact.

Many seedings cannot be irrigated, making mulches a valuable tool for minimizing moisture loss (Sandifer, TN-49, 1997 and Owens, Christensen and Dyer, TN-51, 1997). Imprint seeding is an effective method for addressing this because it creates furrows around the seeds, funneling water to them. Other ways of producing a similar effect using traditional equipment can be explored. Where irrigation is not possible, the seeding must be timed to take full advantage of seasonal precipitation.

Seeding after wildfires and planting in wildfire prone areas requires an evaluation of fire intensity, soil seed banks and careful plant selection (Dyer, TN-36, 1995; Bishop, TN-39, 1995; Dyer, TN-41, 1996; Dyer, TN-57, 1999; Dyer, TN-61, 2001).

Maintenance

Maintenance is the key to successful plantings whether using native or non-native plants. Measures might include watering, weed treatment, and replacement of dead or diseased plants. Maintenance practices and schedules obviously vary with each project and type of planting (seeding vs. tree/shrub planting etc.). A minimum of 2 to 3 years of maintenance should be planned.

Native Grass Plantings

There are many benefits of perennial, native grasses, but they require 3 or more years to establish and additional effort to maintain. Native seed is more expensive and not as available, but this is gradually changing. Additional practices are usually warranted. Such practices might include tilling prior to planting, pre- and post-planting weed treatments, controlled

burning or grazing. In areas where rainfall is low and irrigation isn't an option, establishing natives can be even more difficult. Thorough research and planning are necessary for successful native grass plantings. All of the factors cannot be covered in this document and planners are encouraged to seek additional information and training (CNGA - California Native Grass Association, workshop handbook, 2002; Sandifer, TN-49, 1997; Espinosa, T., TN-59, 2000 and Dyer, D., TN-60, 2001).

In selecting species or ecotype, planners should consider characteristics such as seedling vigor, environmental range, genetic diversity within a species, susceptibility to frost, drought and disease, and if it is a short- or long-lived species. (Bishop, TN-37, 1994; Bishop, TN-40, 1996 and Dyer, TN-64, 2001). Considering this information, it may be sensible to do a phased planting where, for example, a slower growing species, such as melic grass is planted a year before a more aggressive species, like slender wheatgrass or California brome. Any mixes used should contain a balance of fast-growing, short-lived species with slower-growing, long-lived species. Another situation where a phased planting might be appropriate is with riparian shrubs, where the more drought and sun-tolerant species are planted first with the less tolerant species planted later.

The knowledge base for understanding the biology of native grasses and their utility management is growing. Available information on species varies but is generally limited so each field planting is an opportunity to further increase what we know. Native grasses represent one alternative that can be presented to NRCS cooperators. Public demand for developing this technology is increasing. NRCS has the opportunity to serve new clientele, while still serving its traditional customers, many of whom might also consider natives if they are proven effective and economical.

Botany Books and Other Resources For Native Plants

Barbour, M.G. & J. Major. 1995. Terrestrial Vegetation. California Native Plant Society Press, Sacramento, CA.

Review: This seminal work has been around awhile. The original work had a vegetation map to go with it. Subsequent editions lack the map. The book gives detailed descriptions of the floristic provinces of California, covering different vegetation communities within each province. It is a classic work and gives excellent background information.

Price: Around $60. Available from the California Native Plant Society (CNPS).

Barns, R.M and B.H. Honkala. 1990. Silvics of North America: Volume I: Conifers. USDA Forest Service, Agricultural Handbook 654, Washington D.C.

Review: This is a big book that gives lots of great information on the ecology, reproduction, and much more of North American conifers. There is also a volume on hardwoods, but these books are out of print and is extremely hard to get. However, it is worth trying.

Price: Free if you can find it. Try calling the Forest Service's publishing offices directly and be persistent!

Becking, Rudolph. 1982. Pocket Flora of the Redwood Forest. Island Press. Covelo, CA.

Review: Again, a paperback that has photos, great line drawings, keys, plant description and range, and written & pictorial glossaries on plant characteristics. It provides a lot of information, covering the major taxa of the redwood forest. It would be helpful to those working in the north coast redwood forests, and further south also, as many of the same or similar species are present.

Price: Inexpensive (under $20).

Blackwell, L.R. 1999. Wildflowers of the Sierra Nevada and Central Valley. Lone Pine Publishing.

Price: $15.95 softcover, CNPS

Bossard, C. ed. 2000. Invasive plants of California wildlands. University of California Press, Berkelely, CA.

Review: Similar in concept to Weeds of the West. Has more information on weed reproductive biology with control techniques and good literature citation.

Price: around $25.

California Native Plant Society. 1994. Inventory of rare and endangered vascular plants of California: Fifth Edition. Published by CNPS.

Review: Contains a listing of all threatened, rare and endangered plants of the state; their habitat, the counties where they occur etc. CNPS has their own ranking system which is widely recognized by agencies (even if the agencies have a different nomenclature) throughout the state. The inventory is revised periodically so make sure you have the most recent version.

Price: Around $25. The inventory is also available as a computer software program and costs approx. $200.

Chatfield, K. 1997. Medicine from the Mountains: Medicinal Plants of the Sierra Nevada. Range of Light Publications, South Lake Tahoe.

Review: Written by an herbalist. This is not a book on how to identify plants but gives the uses and properties of 33 common plants. It is organized by plant common name. Each plant is beautifully illustrated. Great for those working with tribes as book gives traditional uses of native Americans. Many of these plants are not unique to the Sierra Nevada in terms of their value as medicinal. Small paperback.

Clark, C.B. 1977. Edible and Useful Plants of California. University of California Press, Berkeley, CA.

Review: Paperback—again uses in terms of early native Americans. Contains line drawings and photos and recipes for use of the plants.

Price: Inexpensive.

Crampton, B. Grasses of California. University of California Press, Berkeley, CA.

Review: A small paperback that, for its size, contains good information on the conspicuous California grasses, both native and non-native.

Price: Inexpensive.

Cronquist, A., etal. 1994. Intermountain Flora: Volumes I-VI. Reprinted by the New York Botanical Garden, New York.

Review: This comprehensive series is expensive but worth it. Each volume covers a number of plant families. These books contain detailed line drawings, good keys, species descriptions and geographic range. Intended to cover the northern Great Basin including most of Nevada, se Oregon, southern Idaho, and most of Idaho, it is of most utility to folks working in eastern California since many of the same species occur there but it also includes many wide-ranging, yet predominant pacific northwest. This is a great reference--highly recommended as a tool for identification. A few major families are missing like the Brassicaceae or mustard family. An additional volume is supposed to be completed in 2003-2004.

Price: It's cheaper to buy the whole series than piecemeal. They used to offer a deal for all 6 volumes for $275.

Dir, M.A. and C.W. Heuser, Jr. 1987. The reference manual of woody plant propagation: from seed to tissue culture. Varsity Press, Athens, Georgia.

Review: This book has very good introductory sections giving the big picture on plant propagation. Many of the species are east coast in origin, but you can often make some inferences about similar species or groups of plants.

Price: Approx $40. It's a soft cover available through Amazon.

Dole, J.W. & B.B. Rose. 1996. Shrubs and trees of southern California Deserts: An amateur botanist's identification manual. Footloose Press.

Price: $14.95 soft cover, CNPS

Emery, D. 1988. Seed Propagation of Native California Plants. Santa Ana Botanic Garden, Claremont, CA.

Review: This little book is still touted as a great source of information on how to treat native seed. Many of the species covered are cosmopolitan, others more specific to discrete regions within the state.

Price: Inexpensive.

Faber, P.M. 1996. Common wetland plants of coastal California: A field guide for the layman. Pickleweed Press, CA.

And……..

Faber, P.M. 1996. Common riparian plants of California: A field guide for the layman. Pickleweed Press, CA.

Review: These two books are somewhat useful. The pictures are photocopies of herbarium specimens. They give a brief species description, notes on habitat and range, and a habit key. Each book talks at length in the introduction about the importance of wetlands and riparian ecosystems. These are good books for beginners and while not comprehensive, contain some of the major species.

Price: $18 each, soft cover or the pair for $32 through CNPS

Ferris, R. 1968. Native Shrubs of the San Francisco Bay Region. University of California Press, Berkeley, CA.

Review: A little paperback that covers the major plants of the area. It contains line drawings, photos, a taxonomic key, and species descriptions

Hickman, J. ed. 1996. Jepson Manual of Higher Plants of California. University of California Press, Berkeley, California.

Review: Successor to Munz and the earlier Jepson Manual as the comprehensive flora of the vascular plants of California. In addition to the plant keys, species descriptions, habitat and range of species found in the earlier floras, the Jepson Manual also contains more pictures, culture information, simplified taxonomic terminology, and a glossary that includes some pictures. It was intended to be more user friendly to lay people than previous works, which it accomplishes, however, it can still be difficult to use for people without much botany background.

Price: $80, hardcover, CNPS.

Hitchcock, A.S. 1971. Manual of the grasses of the U.S.: Volumes I & II. Dover Publications, New York.

Review: Standard textbook in agrostology classes. Not the best pictures but these are included for many species. They include decent keys, species descriptions, and habitat & range.

Price: Both hard and soft cover available.

Hitchcock C.L. etal. 1964. Vascular Plants of the Pacific Northwest. University of Washington Press, Seattle, WA.

Review: This is comprised of several volumes. It is similar to the Intermountain Flora in terms of scope, how organized, and level of quality. Another great resource. They can be picked up used occasionally, at least separate volumes can.

Price: Expensive but worth it.

Horn, E. 1995. Coastal Wildflowers of the Pacific Northwest. Mountain Press Publishing Co.

Review: Small paperback picture book. A great book for beginners. It has lots of photos, plant descriptions, and species geographic range. It covers the most conspicuous families and species. The biomes covered include beaches & dunes, wetlands, cliffs & grasslands, and coastal forests.

Price: Inexpensive.

Hotchkiss, N. 1972. Common marsh, underwater & floating-leaved plants of the U.S. and Canada. Dover Publications, New York.

Review: This book may no longer be in print. It is a paperback book geared to the beginner. It has the usual species descriptions, keys and illustrations. The pictures are not very detailed but they do provide the basic information for identifying some groups of plants.

Price: Expensive

Hurd, E.G., Shaw, N.L., Mastrogiuseppe, J., Smithman, L. and S. Goodrich. 1998. Field guide to the intermountain sedges. USDA General Technical Report RMRS-GTR-10, Rocky Mtn. Research Center, Ogden, UT.

Review: This pocket field guide is most appropriate for those working in northeastern California, although many of the species occur in other areas too. It has great photos of important taxonomic traits and line drawings of the whole plant, a picture-glossary, species description, habitat and range, and special identification tips.

Price: Free government publication while supplies last.

Lenz, L. & Dourley. California native trees and shrubs. Rancho Santa Ana Botanic Garden, Claremont, CA.

Lenz, L. Native Plants for California Gardens.

Martin, A.C. et al. 1951. American wildlife & plants: A guide to wildlife food habits. Dover Publications, New York.

Review: This small paperback attempts to distill a lot of field data that was collected on wildlife food preferences. It can be used to establish generalities in plant values for wildlife, but not necessarily definitive relationships. Sometimes the book only refers to plants on the generic level, or the plant species are from the east coast, so be cautious about extrapolating relationships. The concept of the book is sound though. It lists all the known parts of the plant used and ranks them in terms of preferences by wildlife. You can either look up the plant or the animal you are targeting.

Price: Inexpensive paperback.

Mason, H.L. 1957. A flora of the marshes of California. University of California Press, Berkeley, CA.

Review: One of the few comprehensive books covering the flora of marshes which includes plants found in other types of wetland habitats as well. It contains taxonomic glossaries, keys, species descriptions, and line drawings.

Price: Approx. $60 for a hardcover copy.

Moore, M. 1979. Medicinal Plants of the Mountain West. Museum of New Mexico Press.

Review: Covers all of California—the central valley, northwestern CA, and the southern deserts, which have fewer representatives than the rest of the state but there are definitely some from these areas. It is indexed by plant common name, includes line drawings and some photos.

Price: Inexpensive.

Munz, P. 1963. California Wildflowers. University of California Press, Berkeley, CA.

Review: Another small, paperback picture book that focuses on wildflowers. It has some photos and line drawings. The area covered is “roughly the yellow pine belt and upward through red fir and sub-alpine forests to

the peaks above timber line." Possibly too high elevation for most NRCS clients. It could still help someone trying to learn the main attributes of conspicuous genera.

Price: Inexpensive.

Munz, P. 1963. A California Flora. University of California Press, Berkeley, CA.

Review: Less user-friendly than the Jepson Manual and undoubtedly some of the information is dated. However it is still a useful reference. It has very minimal pictures but it does give flowering timeframe for species and has an extensive glossary.

Nakemura, G. and J. Nelson, ed. 2001. An illustrated guide to selected rare plants of northern California. University of California, Agriculture and Natural Resources Publication 3395.

Review: This book covers many, but not all of the currently listed species. Although the listings will change over time, making this work outdated, a majority will probably remain listed, making it a useful reference for a long time. It has good species descriptions that include habitat description, best window for identification, and presently known locations (at the quadrangle level). It has good diagnostic traits for ease in identification, plant photos, habitat and range.

Price: Around $15-20.

Petersen, V. and V. Petersen Jr. 1975. Native Trees of the Sierra Nevada. University of California Press, Berkeley, CA.

Review: A small, paperback pocket guide. Includes both evergreen and deciduous conifers and hardwoods. Another good book for beginners. It packs a lot of information in and has some nice drawings.

Price: Inexpensive.

Sampson, A.W. and B.S. Jespersen. 1963. California range brushlands and browse plants. University of California Publication 4010. University of California, Division of Agriculture and Natural Resources.

Review: Useful little book that has species description, keys, illustrations and geographical range, and use as forage.

Price: Approx. $20.

Sawyer, J.O. and T. Keeler-Wolf. 1995. The Manual of California Vegetation. California Native Plant Society Press, Sacramento, CA.

Review: This work attempts to create a uniform classification for the vegetation of California. It focuses on the lower floristic levels, the series or association level. The information on each series includes: description of the type and the habitat in which it occurs, its distribution (geographic regions within the state follow the nomenclature of the Jepson Manual), a list of species associated with the series, other names for the type from past classifications, and bibliographical references. The book also includes some nice photos of selected types. This is a collaboration of CNPS, federal and state agencies.

Price: Around $50-60. Available from CNPS.

Schmidt, M.G. 1980. Growing California Native Plants. University of California Press, Berkeley, CA.

Review: This was a fairly comprehensive book for its time even though it's a small paperback. There aren't many good books on growing natives. This one has both general and specific culture requirements depending on species, and some genera are given more attention than others.

Price: Approx. $10-$15.

Seeds of Woody Plants in the U.S. 1974. USDA Forest Service, Agricultural Handbook 450.

Sheley, R.L. and J.K. Petroff, eds. 1999. Biology and Management of Noxious Rangeland Weeds. Oregon State University Press, Corvalis, OR.

Review: This book has several introductory chapters that give a good overview on the problem of noxious weeds. It profiles about 25 species or groups of plants individually. There is a lot of good information in each profile. Since there are some weeds that aren't in the other books that are in here (such as scotch thistle), it is another good resource to have. Although the book comes out of Oregon, California has many of the same noxious weeds.

Price: Approx. $20-25.

Showers, M. 1999. Nursery Sources for California Native Plants (DMG Open File Report 90-04). California Dept. of Conservation, Division of Mines and Geology, Sacramento, CA.

Review: The list includes sources for 1600 native California plant taxa. It includes sources for bare root plants. Gives the address, phone, and in some cases email address of sources. One thing it doesn't give that we need to make sure we inquire about is the general location information of the parent stock. Nurseries may act like this information is proprietary, but if they are informed, they will know it's appropriate for planners to ask, and at least give you general information (eg. county, elevation, type of habitat). Don't be shy in insisting to have this information. The publication will become out of date, but hopefully revisions will follow. Its definitely, a good resource.

Price: $10.

Stuart, J.D. and J.O. Sawyer. 2001. Trees and shrubs of California. University of California Press, Berkeley, California.

Review: This paperback field guide just came out. It has beautiful line drawing illustrations, some color plates, individual species descriptions & identification tips; maps of species distribution; keys to genus and species. The book delineates ecological regions throughout the state and cross-references with individual species range & habitat. It is a great little resource.

Price: $22.50 soft cover, CNPS

Taylor, R.J. 1992. Sagebrush Country: A Wildflower Sanctuary. Mountain Press Publishing Co.

Review: A small paperback picture book—not comprehensive but can help with some of the major genera.

Price: Inexpensive, $15

Thomas, J.H. 1961. Flora of the Santa Cruz Mountains: A Manual of the Vascular Plants, Stanford University Press, Stanford, CA.

Review: This book is a well-known standard for the Santa Cruz Mountains. The drawings included are very good, no photos. The style is typical for its era. It has a great description of the area covered, taxonomic keys and plant descriptions. Better for the intermediate to advanced plant enthusiast.

Price: Soft-bound, may be available used.

Van Dersal. Native Woody Plants of the United States. Published by USDA.

Weeden, N. 1986. A Sierra Nevada Flora. Wilderness Press, Berkeley, CA.

Review: Small paperback pocket guide that is basically a key. No photos, line drawings are not very good and the region covered is typically above 3500 ft. on the western side of the SN and above 8000 ft. on the east, so it is probably not appropriate for most NRCS clients.

Whitson, T.D. ed. 1996. Weeds of the West. University of Wyoming, Jackson, WY.

Review: About 50 common weed species in the west are covered in this book. It includes several photos for each species, species descriptions including their negative effects, and geographic range. A disadvantage is it doesn't give any advice on control methods but it is still a good resource. Paperback.

Price: Relatively inexpensive.

Weeds of California, State of California

The Grower's Weed Identification Handbook

Western Wetland Flora: Field Office Guide to Plant Species. USDA NRCS publication. Western region, Sacramento, CA.

> Review: This comprehensive book has photos, map of geographic range, species description and field identification tips.
>
> Price: Free of charge.

Harrington, H.D. 1977. How to identify grasses and grass-like plants. Swallow Press/University of Ohio Press, Athens, Ohio.

> Review: Nice little book for those wanting to venture into identifying grasses—basically a glossary including line drawings and text description.
>
> Price: Inexpensive.

Other floras available for specific areas (can buy from the CA Native Plant Society):

Flora of Sonoma County
A Key to Vascular Plant Species of Kern County, CA, and A Flora of Kern County, CA
Manual of the Vascular Plants of Butte County, CA
Illustrated Field Key to the Flowering Plants of Monterey County

Other book suggestions:

Peterson Field Guides
Audubon Field Guides

Journal articles/technical reports

Beetle, A. 1947. Distribution of the Native Grasses of California in Hilgardia 17(9):309-357.

Review: In this seminal paper, the author divides the state into floristic units (eg. northern coast ranges, southern coast ranges, high elevation etc.) and reviews the major grass taxa within each unit. Species distribution maps are also included, although distributions have likely changed and more information is known now than when it was written. A good general resource.

Web Sites

CalFlora: http://www.calflora.org

Review: Contains plant species information (habitat, distribution, legal status, wetland code, name synonyms), species occurrence data, and photos. A great resource.

California Native Plant Society: http://www.cnps.org

California Native Grass Association: http://www.cnga.org

The Nature Conservancy: http://www.tnc.ucdavis.edu

Review: weed abstracts

CALPHOTOS: http://elib.cs.berkeley.edu/flowers

Review: Has photos of many plants, animals, fungi.

PLANTS Database: http://plants.usda.gov/

ARS Noxious weeds of the US and Canada: http://invader.dbs.umt.edu/Noxious_Weeds/

UC Davis Weed Research and Information Center: http://wric.ucdavis.edu

Calif. Dept. of Food & Agriculture: http://plant.cdfa.ca.gov

Plant Material Centers: http://Plant-Materials.nrcs.usda.gov/

Fire Effects Information Database, U.S. Forest Service: http://www.fs.fed.us/database/feis/

Training Courses

For instruction in plant identification:

- Jepson Herbarium, U.C. Berkeley, CA. Offer 2 or 3 day intensive workshops to aid plant identification at family, genus, and species levels. Also offer crash courses in basic botany and overview of 50 common plant families. Cost ranges from $175 for 2-3 day workshops and $220 for 4 day courses. Slight discount for members.
- California Native Grass Association, Davis, CA.
  a) Offer 1 day grass identification course for the major grass tribes. Students will learn grass morphology, terminology, and how to use keys (Jepson Manual, Munz and others).
  b) Offer grass restoration workshop and prescribed fire workshops also.
- Friends of the Chico State Herbarium, Chico, CA. Offer 1 day workshops on select plant groups at a reasonable price ($40-60) at the CSU, Chico campus.
- Society for Ecological Restoration Annual Conference
- Society for Range Management Annual Conference
- Plant Materials I & II

Resources for Plant Identification

- University Extension
- University of California, Agriculture and Natural Resources Division
- University Herbaria
- California Dept. of Food & Agriculture
- Botanical Gardens
- Local CNPS chapter
- Commercial nurseries

Organizations

- California Native Plant Society (CNPS)
- California Native Grass Association (CNGA)
- Society for Ecological Restoration
- California Exotic Pest Plant Council (CALEPPC)
- Friends of the Jepson Herbarium
- Friends of the Chico State Herbarium
- The Nature Conservancy
- Society for Range Management
- Soil & Water Conservation Society

Publications

- *Fremontia* (CNPS)
- *Madrono* (California Botanical Society)
- *Noxious Times*
- *CALEPPC Newsletter*
- *Grasslands* (CNGA)

- *Restoration Ecology*
- *Restoration & Management Notes*

Note: This list is not exhaustive.

References

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Anderson, J. 1999. Using transplants to establish native grasses, sedges and rushes in Bringing Farm Edges Back to Life! Yolo RCD, Woodland.

Knapp, E. and K. Rice. 1994. Starting from seed: Genetic issues in using native grasses for restoration. Restoration and Management Notes 12:40-45.

Peters, S. 2002. Mycorhizal inoculum: Evaluating need and performance in revegetation and reclamation projects. Grasslands XII, No. 4.

San Francisquito Creek (California) Bank Stabilization and Revegetation Master Plan. Section 5: Vegetation Restoration Guidelines.

Showers, M. 1999. Nursery Sources for California Native Plants. California Dept. of Conservation, Office of Mines & Reclamation. Sacramento, CA. Cost is $10. To order, call 916-445-5716.

Stewart, S. 2002. Mr. Stewart is owner/operator of Conservaseed. In addition to selling native seed, he is a restoration consultant and also grows starts from seed. He is also researching and developing amendment products for use in restoration/revegetation projects.

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Sandifer, D. 1997. Native Grass and Clear Water: Restoration of the Grass Valley Creek Watershed, Trinity County, California. Technical Note 49.

Owens, J., Christensen, K. and Dyer, D. 1997. Hand Crimping Straw Mulch on Critical Area Planting Sites Provides Superior Results. Technical Note 51.

Dyer, D. 2000. Landscaping With Fire Resistant Plants. Technical Note 57.

Espinosa, T. 2000. Review of “Know Your Natives – A Pictorial Guide to California Natives. Technical Note 59.

Dyer, D. 2001. Review of Information Manual “Riparian Vegetation Management for Pierces,s Disease in North Coast California Vineyards”. Technical Note 60.

Dyer, D., Bishop, G., Grim, J., and Sheldon, W. 2001. Erosion Control Effectiveness if Vegetative Practices After the 1993 Southern California Wildfires. Technical Note 61.

Dyer, D. 2001. Soil Quality Improvement Using Mycorrhiza Inoculation and its Effects on the Propagation Of California Native Plants. Technical Note 62.

Dyer, D. 2001. Review of Paper “Mode of Reproduction and Amplified Fragment Length Polymorphism Variation in Purple Needlegrass (Nassella Pulchra): Utilization of Natural Germplasm Sources”. Technical Note 64.

California Native Grass Association, Davis, CA, 2002, Using Native Grasses and Graminoids in Restoration and Revegetation, A CNGA Training Workshop.

Projects for CAPMC

Sequoia/Kings Canyon National Park

FY2004 Annual Report
Prepared by

NATURAL RESOURCES CONSERVATION SERVICE
LOCKEFORD PLANT MATERIALS CENTER

INTRODUCTION - During FY2004, six different species were grown at the Lockeford PMC for maximum seed production. A total of 101.54 pounds of pure live seed (PLS) was produced at the PMC. The project total is now 189.81 pounds of PLS. The PMC propagated 4000 plugs of two species for transplanting on an area which was covered with weed control fabric. The fabric allowed shattered seed to be vacuumed up with no soil.

This project started in FY2003 and will be completed in FY2005. The overall goal of the project is to produce a minimum of 150 PLS pounds of seed form six species.

ACCOMPLISHMENTS – All initial seed collection was accomplished by the park staff. The seed was then cleaned by PMC staff and tested by a seed laboratory. The initial cleaned seed was then used to propagate plants for placement on fabric (5000 S.F., one foot spacing) of three species (Trifolium ciliolatum, Lupinus bicolor, Poa secunda) and direct seed three species (Melica californica, Elymus glaucus, Bromus carinatus) on 30 inch rows .5 acre ea. . The three species on the fabric were had harvested and shattered seed was vacuumed off the fabric. The three direct seeded species were harvested using a FailVac or combine harvester. All seed was cleaned and tested.

Species	**FY03 PLS Lbs.**	**FY04 PLS Lbs.**	**Total PLS 03&04**
Trifolium ciliolatum 9083009 TRCI	22.93	6.5	29.43
Lupinus bicolor	28.37	32.75	61.12

9083008 LUBI			
Poa secunda 9083007 POSE	.15	.59	.74
Melica californica 9083006 MECA	.54	.70	1.24
Elymus glaucus 9083005 ELGL	26.70	35.0	61.7
Bromus carinatus 9083004 BRACA	9.58	26.0	35.58 **189.81**

TECHNOLOGY DEVELOPMENT – All seed cleaning was documented and screen size and air flow for each species was determined. The weed control fabric was successfully used to control weeds and allow shattered seed to be vacuumed up with out soil.


Poa secunda

Trifolium cilioatum


Lupinus bicolor


Melica californica


Elymus glaucus


Bromus carinatus

Development Of Native Plant Seed For Restoration Of Retired Agricultural Lands In The San Joaquin Valley

USDI - BOR Agreement No. 03AA210003

FY2004 Annual Report
Prepared by
USDA
Natural Resources Conservation Service
Lockeford Plant Materials Center

Introducton

The Lockeford PMC is augmenting the limited supply of native San Joaquin Valley plant seeds to be utilized in the large-scale restoration efforts of 200,000 acres of retired agricultural land. The project goal is to develop foundation seed which can then be used by the seed industry to grow large quantities and to determine which native species can be grown on a large scale using agricultural machinery. Also, the selection and field increase of a few species would be accomplished the second year.

Accompleshments

20.3 pounds of seed was harvested and cleaned from the fabric seed production area. 29310 plants were propagated of which 6,000 germinated and were planted on the fabric area for weed control and ease of seed harvest. Detailed seed cleaning records and propagation records were maintained to determine which species had the greatest potential for large scale increase. A two acre area was prepared and five species were planted for large scale increase in the fall of 2004.

2003 BOR SEED CLEANED

SPECIES	ACC # T2 Est. Purity	BEGINNING WT.	CLEAN WT.
1. Alkali sacaton SWC-03-BOR	(63% X 98% = 62% PLS)	.92#	.42# (.26# PLS)
2. Helianthus annus SWC-03-BOR	(37% X 75% = 28% PLS)	.82#	.16# (.04# PLS)
3. Lasthenia chrysantha SWC-03-BOR	(28% X 55% = 15% PLS)	1.36#	.50# (.07# PLS)
4. Phacelia ciliata SWC-03-BOR	(37% X 70% = 26% PLS)	167 grams	164 grams (42.6 g PLS)
5. Hemizonia pungens SWC-03-BOR		23.0#	.67#
6. Guillenia lasiophylla SWC-03-BOR)	(25% X 95% = 24% PLS) (Coll. Code: W_PAN-2)	4.0 grams	3.4 grams (.8 g PLS)
7. Trichostema ovatum SWC-03-BOR	(19% X 85% = 16% PLS) (BOR Cleaned seed) (Coll. Code: NRSY-NKER)	21.0 grams	21.0 grams (3.4 g PLS)
8. Gutierrezia californica SWC-03-BOR	(25% X 40% = 10% PLS) (BOR Cleaned seed) (Coll. Code: W_PAN-2)	20 grams	20 grams (2.0 g. PLS)
9. Lotus scoparius SWC-03-BOR	(37% X 90% = 33% PLS) (Coll. Code: CANTUA-CREEK)	34 grams	32 grams 10.6 g PLS)

10.	Monolopia stricta SWC-03-BOR	(41% x 80% = 33% PLS) (Coll. Code: NRSY-STF)	214 grams	6.1 grams (2 g PLS)
11.	Poa secunda SWC-03-BOR	(51% X 90% = 46% PLS) (Coll. Code: W_PAN-2)	8 grams	3 grams (1.4 g PLS)
12.	Vulpia microstachys SWC-03-BOR	(Coll. Code: W_PAN-2)	10 grams	6.5 grams
13.	Castilleja exserta SWC-03-BOR	(49% X 80% = 39% PLS) (Coll. Code: OLFR-B)	36 grams	34 grams (13.3 g PLS)
14.	Lasthenia californica SWC-03-BOR		1.28#	.09#

2003 BOR SEED CLEANED LOT: SWC-03-BOR

SPECIES	T2 Test	Est. Purity	PLS%	Beginning Wt.	Clean Wt.	PLS Wt.
1. Alkali sacaton Acc. 9083032	63%	98%	62%	.92#	.42#	.26#
2. Helianthus annuus Acc. 9083033	37%	75%	28%	.82#	.16#	.04#
3. Lasthenia chrysantha Acc. 9083034	28%	55%	15%	1.36#	.50#	.07#

4.	Phacelia ciliate Acc. 9083035	37%	70%	26%	1.67#	164 g.	42.6 g.
5.	Hemizonia pungens Acc. 9083036	26%	75%	20%	23.0#	.67#	.13#
6.	Guillenia lasiophylla Acc. 9083037	25%	95%	24%	4.0 g.	3.4 g.	.8 g.
7.	Trichostema ovatum Acc. 9083038	19%	85%	16%	21 g.	21 g.	3.4 g.
8.	Gutierrezia californica	25%	40%	10%	20 g.	20.g.	2.0 g.
9.	Lotus scoparius Acc. 9083040	37%	90%	33%	34 g.	32 g.	10.6 g.
10.	Monolopia stricta Acc. 9083041	41%	80%	33%	214 g.	6.1 g.	2.0 g.
11.	Poa sucunda Acc. 89083042	51%	90%	46%	8 g.	3 g.	1.4 g.
12.	Vulpia microstachys Acc. 9083043	41%	95%	39%	10 g.	6.5 g.	2.5 g.
13.	Castilleja exserta Acc. 9083044	40%	80%	39%	36 g.	34 g.	13.3 g.

No T2 Test Results 1.28# .09#

14. Lasthenia californica
    Acc. 9083045

15. Isocoma acradenia
    Acc. 9083046

(T2) (Est.) (Clean)
Germ % X Purity % = % PLS %PLS X Wt. = PLS Wt.

CLEANING TIME: 2.5 hrs.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Helianthus annuus
CULTIVAR ACC. # LOT. # SWC-03-BOR

NUMBER OF BAGS OR BINS 1 bag APPROX. TOTAL WT. .82#
FIELD # OR COLLECTION LOC. Town: Tranquility, Fresno County
HOW HARVESTED -
COLLECTED - THRESHED By hand DATE 8-18-03

HAMMERMILL NO / YES SPEED 750 SCREEN SIZE 1/4 VACUUM%

CLIPPER Small SCREEN SIZE, TOP 8 MIDDLE -- BOTTOM Blank

AIR OPEN 30 % RPM

OTHER REQUIREMENTS

Hammered once to knock seed from florets. Then hand screened with size 8 screen to scalp off all

Large inert matter, stems, florets, etc.

REPORT 3 clipper runs to remove chaff. There is still a small amount of inert in seed.

Too difficult to remove & would lose more seed in the process.

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT .16#

BUSHEL WT. BIN # R8A GERM: T2 Test 37%

REMARKS

Coll: 8-18-03 Latitude: 36°36'41.9" N

Town: Tranquility Longitude: 120°18'56.2" W

County: Fresno

BY Jim Hutson DATE 10-2-03

CLEANING TIME: 6.5 hrs.

LOCKEFORD PMC

SEED PROCESSING AND CLEANING REPORT

SPECIES Lasthenia chrysantha

COMMON NAME Alkalisink goldfield ACC. # 9083034 LOT. # SWC-03-BOR

NUMBER OF BAGS OR BINS 1 bag APPROX. TOTAL WT. 1.36#

FIELD # OR COLLECTION LOC. Town: Kerman, County: Fresno Lat: 36°44'05.1" N
Elev. ~ 52 m. Long: 120°13'22.1" W

HOW HARVESTED -
COLLECTED - THRESHED Hand coll. DATE 8-16-03

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%

CLIPPER Small SCREEN SIZE, TOP 1/12 MIDDLE -- BOTTOM 5Δ

AIR OPEN Closed taped off % RPM

OTHER REQUIREMENTS 1st clipper run – used Top screen 1/12, Bottom 5Δ, to scalp large material
off & drop the seed thru both screens bypassing the air. So the seed came out the side junk chute.
Second run, I used the 5Δ on top & a blank on bottom with air taped off so the seed falls in the bottom
tray.

REPORT Ran junk chutes back thru 2 more times.

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT .50#
BUSHEL WT. BIN # R8A GERM: T2 Test 28%
REMARKS The seed is very light, which makes it very hard to clean. The separation of inert is
Almost impossible because the seed is as light as the inert so the air cannot be used. Cannot be combined
because seed is so light in wt.

BY Jim Hutson DATE 10-3-03
CLEANING TIME: 10 min.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Phacelia ciliata

CULTIVAR ACC. # LOT. # SWC-03-BOR

NUMBER OF BAGS OR BINS 1 bag APPROX. TOTAL WT. 16.7 gram

FIELD # OR COLLECTION LOC.

HOW HARVESTED -

COLLECTED - THRESHED hand DATE 4-30-02

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%

CLIPPER SCREEN SIZE, TOP MIDDLE BOTTOM

AIR OPEN % RPM

OTHER REQUIREMENTS

Just hand screened with screen size 1/12 to scalp off all large inert.

REPORT

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT 164 gram
BUSHEL WT. BIN # R8A GERM: T2 Test 37%
REMARKS

BY Jim Hutson DATE 10-6-03

CLEANING TIME: 16 hrs.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Hemizonia pungens
CULTIVAR ACC. # LOT. # SWC-03-BOR

NUMBER OF BAGS OR BINS 1 sack APPROX. TOTAL WT. 23#

FIELD # OR COLLECTION LOC.

HOW HARVESTED -

COLLECTED - THRESHED Mowed & dried on tarps DATE 9-12-03

HAMMERMILL NO / YES SPEED 750 SCREEN SIZE 3/16 VACUUM% 50

CLIPPER Small SCREEN SIZE, TOP 1/22 MIDDLE BOTTOM Blank

AIR OPEN Taped off % RPM

OTHER REQUIREMENTS

Had to hand screen: sizes #14 then hand screened dirt with size 1/22. Then hammered lot using a 3/16

hammer screen, then hand screened again with size #8 to scalp off stems.

REPORT Very time consuming to process. A lot of hand screening before the mechanical cleaning process.

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT .67#

BUSHEL WT. BIN # R8A GERM: T2 Test 26%

REMARKS Seed is very small & black in color. Also light brown in glums. A lot of dirt in the lot
left after the clipper run with 1/22 screen. So I had to hand sift dirt with a wire mesh screen size 26 x 26.
Then ran thru clipper again with size 1/22 top screen & air at 20% open.
The seed is too small & light for combine.

BY Jim Hutson DATE 10-7-03

CLEANING TIME: 10 min.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

(coll. code: W-PAN-2)

SPECIES Guillenia lasiophylla
CULTIVAR ACC. # LOT. # SWC-03-BOR

NUMBER OF BAGS OR BINS 1 bag APPROX. TOTAL WT. 4.0 gram

FIELD # OR COLLECTION LOC.

HOW HARVESTED -

COLLECTED - THRESHED Hand coll. DATE

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%

CLIPPER SCREEN SIZE, MIDDLE BOTTOM

TOP

AIR OPEN % RPM

OTHER REQUIREMENTS

Just hand screened with screen size: 1/22. to scalp off all large inert matter.

REPORT

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT 3.4 grams

BUSHEL WT. BIN # R8A GERM: T2 Test 25%

REMARKS

BY Jim Hutson DATE 10-6-03

CLEANING TIME: 15 min.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

(coll. code: CANTUA-CREEK)

SPECIES

CULTIVAR ACC. # LOT. #

NUMBER OF BAGS OR BINS 1 bag APPROX. TOTAL WT. 34 gram

FIELD # OR COLLECTION LOC.

HOW HARVESTED -

COLLECTED - THRESHED Hand coll. DATE

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%

CLIPPER SCREEN SIZE, TOP MIDDLE BOTTOM

AIR OPEN % RPM

OTHER REQUIREMENTS

Only hand screened with screen size #8 to scalp off all sticks.

REPORT

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT 32 grams

BUSHEL WT. BIN # R8A GERM: T2 Test 37%

REMARKS

BY Jim Hutson DATE 10-6-03

CLEANING TIME: 4 hrs.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

(coll. code: NRSY-STF)

SPECIES Monolopia stricta

CULTIVAR ACC. # LOT. # SWC-03-BOR

NUMBER OF BAGS OR BINS 1 bag APPROX. TOTAL WT. 214 grams

FIELD # OR COLLECTION LOC.

HOW HARVESTED -

COLLECTED - THRESHED DATE

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%

CLIPPER Small SCREEN SIZE, TOP 6 MIDDLE BOTTOM Blank

AIR OPEN 20 % RPM

OTHER REQUIREMENTS

1st had to hand screen seed with size 1/12 using the screen like a grinding process as the lot is very fluffy.

The 1st clipper run, size 6 screen on top was used to remove the fluffy material. 2nd run a size

REPORT A grey inert matter that looks like tiny dirt clods is mixed with the seed. To separate

most of it out, I pulverized it with my finger on a sheet of paper, then sieved if off with a fine screen.

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT 6.1 grams

BUSHEL WT. BIN # R8A GERM: T2 Test 41%

REMARKS

The seed lot is very fluffy & hard to work with.

The seed is hard to identify.

The seed is too small for combine.

BY Jim Hutson DATE 10-7-03

CLEANING TIME: 5 hrs.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Monolopia stricta

CULTIVAR ACC. # 9083041 LOT. # SWC-03-BOR

NUMBER OF BAGS OR BINS 1 bag APPROX. TOTAL WT.

FIELD # OR COLLECTION LOC.

HOW HARVESTED -

COLLECTED - THRESHED Hand DATE 1 Apr 03

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%

CLIPPER No SCREEN SIZE, MIDDLE BOTTOM

TOP

AIR OPEN % RPM

OTHER REQUIREMENTS

Hand screened only. 1st with size 8 screen – grinding with leather gloves on. Second screen size 6 to

Remove the large fluffy inert. Cleaning is very time consuming.

REPORT This species is hard to work with. Recommend seeding with straw blower.

Harvest -

swath & bale for straw blower.

CLEAN SEED: BAGS OR BINS TOTAL WEIGHT

BUSHEL WT. BIN # GERM: No test on this seed.

REMARKS Propagated seed with a lot of fluffy inert into plug flats. This is the 2nd bag of uncleaned seed we received 2 months after 1st lot.

BY J. Hutson DATE 2-12-04

CLEANING TIME: 30 min.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES
CULTIVAR ACC. # LOT. # SWC-03-BOR

NUMBER OF BAGS OR BINS 1 little sack APPROX. TOTAL WT. 8 grams
FIELD # OR COLLECTION LOC.
HOW HARVESTED -
COLLECTED - THRESHED By hand DATE

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%

CLIPPER No SCREEN SIZE, MIDDLE BOTTOM
TOP
AIR OPEN % RPM

OTHER REQUIREMENTS
I had to hand strip seed & then hand screened with a size 1/12 to remove inert matter.

REPORT

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT 3 grams
BUSHEL WT. BIN # R8A GERM: T2 Test 51%
REMARKS

BY Jim Hutson DATE 10-8-03

CLEANING TIME:

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Vulpia microstachys

CULTIVAR ACC. # LOT. # SWC-03-BOR

NUMBER OF BAGS OR BINS APPROX. TOTAL WT.

FIELD # OR COLLECTION LOC.

HOW HARVESTED -

COLLECTED - THRESHED DATE

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%

CLIPPER No SCREEN SIZE, MIDDLE BOTTOM

TOP

AIR OPEN % RPM

OTHER REQUIREMENTS

REPORT Just hand screened with size 1/18 to remove most of inert.

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT 6.5 grams
BUSHEL WT. BIN # R8A GERM: T2 Test 41%
REMARKS

BY Jim Hutson DATE 10-9-03

CLEANING TIME: 1.5 hrs.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Castilleja exserta

CULTIVAR ACC. # LOT. # SWC-03-BOR

NUMBER OF BAGS OR BINS 1 bag APPROX. TOTAL WT. 62 gram
FIELD # OR COLLECTION LOC.
HOW HARVESTED -
COLLECTED - THRESHED Hand coll. DATE

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%
CLIPPER Small SCREEN SIZE, TOP 1/18 MIDDLE -- BOTTOM Blank
AIR OPEN Taped off % RPM

OTHER REQUIREMENTS
2 clipper runs. Seed is hard to clean, so small & light.

REPORT Seed is very small.

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT 34 grams
BUSHEL WT. BIN # R8A GERM: T2 Test 49%

REMARKS Grass seed found in lot. I couldn't separate the grass seed from the lot because more &
more seed is lost with every cleaning run.
Cannot be combined, but possible flail vac.

BY Jim Hutson DATE 10-6-03

CLEANING TIME: 3 hrs.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Lasthenia californica
CULTIVAR ACC. # LOT. # SWC-03-BOR

NUMBER OF BAGS OR BINS 1 sack APPROX. TOTAL WT. 1.28#
FIELD # OR COLLECTION LOC.
HOW HARVESTED -
COLLECTED - THRESHED DATE

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%

CLIPPER Small SCREEN SIZE, Δ5 MIDDLE -- BOTTOM Blank
TOP

AIR OPEN Taped off % RPM

OTHER REQUIREMENTS

REPORT Three clipper runs to separate more inert than seed.

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT .09#

BUSHEL WT. BIN # R8A GERM: No T2 Test done

REMARKS

The seed is very light & small.

I only cleaned the seed to overtake the inert matter (more seed than inert).

I could have cleaned the seed more but would lose seed with each cleaning run.

The seed is too small & light for combine.

BY Jim Hutson DATE 10-16-03

CLEANING TIME: 2 hrs.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Álcali sacaton

CULTIVAR ACC. # 9083032 LOT. # SWC-03-BOR

NUMBER OF BAGS OR BINS 1 bag APPROX. TOTAL WT. .92#

FIELD # OR COLLECTION LOC. 1.5 mi. S. of Kern NWR – 0.75 mi. W. of Corcoran Road.

HOW HARVESTED - July ’02

COLLECTED - THRESHED Hand coll. by William Howse. DATE collected

HAMMERMILL **NO** / YES SPEED SCREEN SIZE VACUUM%

CLIPPER Small SCREEN SIZE, TOP 5Δ MIDDLE -- BOTTOM Blank

AIR OPEN 20 % RPM

OTHER REQUIREMENTS

REPORT Only one run thru the clipper was necessary. Seed cleaned well. Very easy to clean.

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT .42#
BUSHEL WT. BIN # R8A GERM: T2 Test 63%
REMARKS
Collected: July 02
1.5 mi. S. of Kern NWR
0.75 mi. W. of Corovan Road
Coll. by William Howse

BY Jim Hutson DATE 10-1-03

CLEANING TIME: 10 hrs.

LOCKEFORD PMC

BOR

SEED PROCESSING AND CLEANING REPORT

SPECIES Helianthus Annus

CULTIVAR Common Sunflower ACC. # 9083033 LOT. # SCO-04-BOR

NUMBER OF BAGS OR BINS 1 can APPROX. TOTAL WT. 12.5#

FIELD # OR COLLECTION LOC. Field 2

HOW HARVESTED - Hand cut heads 8-3-04

COLLECTED - THRESHED DATE 8-30-04

HAMMERMILL NO / YES SPEED 800 SCREEN SIZE 1/4 VACUUM%

CLIPPER Small SCREEN SIZE, TOP 11Δ MIDDLE BOTTOM Blank

AIR OPEN 50 % RPM

OTHER REQUIREMENTS

The seed heads were hand cut after flowers faded then dried in an open bin.

REPORT 2 clipper runs. The seed cleaned fairly easy.

CLEAN SEED: BAGS OR BINS 1 bag TOTAL WEIGHT 6.75#

BUSHEL WT. 36.3 BIN # R12C GERM: T2 Test 43%

REMARKS The seed heads flower at different times so the harvests are multiple.

The stalks are very woody and had to be cut with a chain saw. This plant cannot be combined.

BY Jim Hutson DATE 9-8-04

CLEANING TIME: 1 hr.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Vulpia microstachys

CULTIVAR ACC. # 9083043 LOT. # SCO-04-BOR

NUMBER OF BAGS OR BINS Packet APPROX. TOTAL WT. .04#

FIELD # OR COLLECTION Field 2

LOC.

HOW HARVESTED -

COLLECTED - THRESHED Hand cut DATE 4/14/04

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%

CLIPPER Small SCREEN SIZE, 1/12 MIDDLE -- BOTTOM Blank

TOP

AIR OPEN 40 % RPM

OTHER REQUIREMENTS

No hammering required.

REPORT Only one clipper run. The seed cleans very well

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT 12 grams

BUSHEL WT. -- BIN # R4C GERM: No T2 Test – not enough seed

REMARKS Not enough seed for a T2 Test.

This seed could be combined or flail vac.

The seed shatters very easily.

BY Jim Hutson DATE 9-8-04

CLEANING TIME: 1 hr.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Poa secunda
CULTIVAR ACC. # 9083042 LOT. # SCO-04-BOR

NUMBER OF BAGS OR BINS 1 packet APPROX. TOTAL WT. .02#
FIELD # OR COLLECTION LOC.
HOW HARVESTED -
COLLECTED - THRESHED Hand cut DATE 6-28-04

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%

CLIPPER Small SCREEN SIZE, TOP 1/12 MIDDLE -- BOTTOM Blank

AIR OPEN 30 % RPM

OTHER REQUIREMENTS

Not enough seed for purity & germ test.

REPORT 1 clipper run – seed cleans easily.

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT 1 gram

BUSHEL WT. -- BIN # GERM: No T2 Test – not enough seed

REMARKS Very little seed harvest.

Combine could be possible.

Flail vac possible – seed will shatter.

BY Jim Hutson DATE 8-30-04

CLEANING TIME: 7 hrs.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Lotus scoparius

CULTIVAR ACC. # 9083040 LOT. # SCO-04-BOR

NUMBER OF BAGS OR BINS 1 bag APPROX. TOTAL WT. 26#

FIELD # OR COLLECTION LOC.

HOW HARVESTED -

COLLECTED - THRESHED Hand vacuumed DATE 8-25-04

HAMMERMILL NO / YES SPEED 750 SCREEN SIZE 1/16 VACUUM%

CLIPPER Small SCREEN SIZE, TOP 6 MIDDLE -- BOTTOM Blank

AIR OPEN 80 % RPM

OTHER REQUIREMENTS

There's not enough seed harvested for purity & germ test.

REPORT The seed is a small kidney shaped, brown in color.

2 clipper runs. The seed cleans fairly well.

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT .06#

BUSHEL WT. -- BIN # R4C GERM: T2 Test 37%

REMARKS The seed shatters.

Combine is not recommended because the plant is like wire weed and seed shatters.

Also, seed maturity is sporadic.

BY Jim Hutson DATE 9-1-04

CLEANING TIME: 7 hrs.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Alkali sacaton

CULTIVAR ACC. # 9083032 LOT. # SCO-04-BOR

NUMBER OF BAGS OR BINS 1 bin APPROX. TOTAL WT. 2.08
FIELD # OR COLLECTION LOC. Field 2
HOW HARVESTED - 8-3-04
COLLECTED - THRESHED Hand cut DATE 8-30-04

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%
CLIPPER Small SCREEN SIZE, Δ5 MIDDLE -- BOTTOM Blank
TOP
AIR OPEN 20 % RPM

OTHER REQUIREMENTS
The seed was hand stripped off of the stalks.
I will send off a T2 Test.

REPORT 1 clipper run – the seed cleaned very well.

CLEAN SEED: BAGS OR BINS 1 packet TOTAL WEIGHT .90#
BUSHEL WT. BIN # R4C GERM: T2 Test 66%

REMARKS This seed could be flailvac.
It's probably too light for combining.
The seed matures at different times so there were 2 separate harvests and maybe one more later.

BY Jim Hutson DATE 9-2-04

CLEANING TIME: 4 hrs.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Phacelia ciliata
CULTIVAR ACC. # 9083035 LOT. # SCO-04-BOR

NUMBER OF BAGS OR BINS 1 can APPROX. TOTAL WT. 2.02#
FIELD # OR COLLECTION LOC.
HOW HARVESTED -
COLLECTED - THRESHED Hand cut DATE 6-7-04

HAMMERMILL NO / YES SPEED SCREEN SIZE VACUUM%

CLIPPER Small SCREEN SIZE, TOP 1/12 MIDDLE -- BOTTOM Blank

AIR OPEN 60 % RPM

OTHER REQUIREMENTS

Hand screened with size 1/12 screen then ran through small clipper.

REPORT 2 clipper runs. The seed cleans easily.

There's not enough seed for a purity & germ test.

CLEAN SEED: BAGS OR BINS 2 packets TOTAL WEIGHT 1.82#

BUSHEL WT. BIN # R4B GERM: T2 Test 68%

REMARKS

Fumigated seed with "Phostoxin" for insects.

May be combined.

BY Jim Hutson DATE 8-31-04

CLEANING TIME: 48 hrs.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES	Lasthenia chrysantha				
COMMON NAME	Alkalisink goldfield	ACC. #	9083034	LOT. #	SCO-04-BOR

NUMBER OF BAGS OR BINS	1 bin	APPROX. TOTAL WT.	7.10#
FIELD # OR COLLECTION LOC.	Field 2		
HOW HARVESTED - COLLECTED - THRESHED	Hand cut	DATE	5-12-04

HAMMERMILL	NO / YES	SPEED		SCREEN SIZE			VACUUM%		
CLIPPER	Small &	SCREEN SIZE, TOP		5Δ 1/16	MIDDLE	-- 5Δ	BOTTOM	Blank	
Eclipse	AIR OPEN	Closed -taped	%	RPM					

OTHER REQUIREMENTS

Hand screened large inert off.

I did a cleaning on the bigger Eclipsed clipper to speed up cleaning process. Top screen 1/16, middle 5Δ,

Bottom Blank. Air closed.

REPORT One clipper run required

Cleaned fairly well but very slow & time consuming.

CLEAN SEED: BAGS OR BINS 3 bags TOTAL WEIGHT 4.06#

BUSHEL WT. 17.2 BIN # R12D GERM: T2 Test 37%

REMARKS

Seed is very light weight. A lot of seed blew off with 0 air. I saved all seed in separate bags.

I do not recommend combine. No flail vac because seed does not shatter.

Maybe baling & straw blower.

BY Jim Hutson DATE 8-31-04

CLEANING TIME: 36 hrs.

LOCKEFORD PMC

BOR **SEED PROCESSING AND CLEANING REPORT**

SPECIES Hemizonia pungens

CULTIVAR ACC. # 9083036 LOT. # SCO-04-BOR

NUMBER OF BAGS OR BINS 1 bin APPROX. TOTAL WT. 19#

FIELD # OR COLLECTION LOC. Field 2

HOW HARVESTED - 6-28-04

COLLECTED - THRESHED Cut by hand DATE 8-25-04

HAMMERMILL NO / YES SPEED 750 SCREEN SIZE 3/16 VACUUM% 50

CLIPPER Small SCREEN SIZE, TOP 1/22 MIDDLE BOTTOM Blank

AIR OPEN Taped off % RPM

OTHER REQUIREMENTS

I ran the stalks through the stripper machine to break down seed pod & inert so hammermill would feed well.

REPORT After 3 cleaning runs there is still a lot of inert matter in seed.

Not enough seed for purity & germ test.

CLEAN SEED: BAGS OR BINS 2 packets & 1 bag of hammered seed TOTAL WEIGHT .17#

BUSHEL WT. Not enough seed BIN # R4C GERM: T2 Test 29%

REMARKS Cleaning is very time consuming. The seed is very small & black in color. The plant is

difficult to work with, thorns, dry & brittle.

I do not recommend this plant for production. Recommend baling & straw blower.

The seed is too small & light for combine.

BY Jim Hutson DATE 8-25-04

(9-8-04)

BOR Propagation 2004
in Greenhouse – for Tarped area

1. Phacelia ciliata
   Acc. 9083035
   SCO-04-BOR
   (This seed cleans easily and could possibly be combined.)

2. Poa secunda
   Acc. 9083042
   SCO-04-BOR
   (This seed cleaned very easily. Possible combine or flail vac as seed will shatter.)

3. Lotus scoparius
   Acc. 9083040
   SCO-04-BOR
   (This plant is somewhat like bindweed but upright. It could possibly be flail vac because seed does shatter. The seed also matures at different times. The seed does clean fairly well.)

4. Vulpia microstachys
   Acc. 9083043
   SCO-04-BOR
   (This seed cleans very well, also shatters. Could be combined or flail vac.)

BOR SEED PROPAGATION

		Cells Propagated	Vigor	Cells Germinated
LARGE SEED INCREASE				
1. Monolopia stricta		1,000	Fair	130
Acc. 9083041	(T2 41%)	(No seed left)		13%
2. Trichostema ovatum		1,600	Poor	10
Acc. 9083038	(T2 19%)	(No seed left)		.6%
3. Castilleja exserta		1,600	Good	391
Acc. 9083044	(T2 49%)	(No seed left)		24%
SMALL SEED INCREASE				
1. Alkali sacaton		600	Good	456
Acc. 9083032	(T2 63%)			76%
2. Helianthus annus		90	Good	78
Acc. 9083033	(T2 37%)	2,000 more cells		86%
3. Lasthenia chrysantha		200	Good	196
Acc. 9083034	(T2 28%)	2,000 more cells		98%
4. Phacelia ciliata		90	Fair	51
Acc. 9083035	(T2 37%)	400 more cells		56%
5. Hemizonia pungens		90	Fair	19
Acc. 9083036	(T2 26%)	400 more cells		21%

6. Guillenia iasiophylla		90	Fair	11
Acc. 9083037	(T2 25%)	400 more cells		12%
7. Gutierrezia californica		90	Good	6
Acc. 9083039	(T2 25%)	400 more cells		6%
8. Lotus scoparius		90	0	0
Acc. 9083040	(T2 37%)	400 more cells		0%
9. Poa secunda		90	Good	62
Acc. 9083042	(T2 51%)			69%
10. Vulpia microstachys		90	Good	90
Acc. 9083043	(T2 41%)			100%
11. Lasthenia californica		200	Good	190
Acc. 9083045	(T2)			95%
12. Isocoma acradenia		200		
Acc. 9083046	(T2)	Prop. On 11-20-03		

BOR SEED REPROPAGATION ON: 11-20-03

Greenhouse Settings:
Irrigation: 8 sec. Every 64 min. from 8:00 a.m. to 4:00 p.m.
Grow Lights: On 12 hrs. daily from: 7:00 a.m. to 7:00 p.m.
Heating: Set at 70° w/ top vent open 1/3.
Plug Flats: Covered w/vermiculite to retain moisture.

PLUG FLATS PROPAGATED

			Cells Propagated	Vigor	Cells Germinated
1.	Lasthenia chrysantha Acc. 9083034	Greenhouse	2,000		
2.	Helianthus annuus Acc. 9083033	Greenhouse Lath house	1,600 400		
3.	Hemizonia pungens Acc. 9083036	Greenhouse Lath house	200 200		
4.	Phacelia ciliata Acc. 9083035	Greenhouse Lath house	200 200		
5.	Lotus scoparius Acc. 9083040	Greenhouse	400		
6.	Gutierrezia californica Acc. 9083039	Greenhouse Lath house	200 200		
7.	Guillenia lasophylla Acc. 9083037	Greenhouse Lath house	200 200		
8.	Isocoma acradenia Acc. 9083046	Greenhouse	200		

Technology Development

A BOR plant evaluation table was developed and is attached to this report as an EXCEL file.

Presentations for CAPMC

Date presented: 10/9/2003
Title: Use of RIO beardless wildrye
Presenter D.Dyer **Location** Sacramento

Date presented: 10/23/2003
Title: BOR contract with the PMC and NRCS
Presenter D.Dyer **Location** PMC

Date presented: 10/29/2003
Title: Arundo CFT at Somis FO, how the PMC will help.
Presenter D.Dyer **Location** Somis, CA

Date presented: 11/20/2003
Title: Lockeford PMC , projects poster
Presenter D.Dyer **Location** Lake Tahoe, CA

Date presented: 11/20/2003
Title: Status of field trials evaluating perennial grasses for rangeland soil carbon sequsetration and bio-mass conversion to fuel potential
Presenter E. Beardsley and D.Dyer **Location** Lake Tahoe, CA

Date presented: 11/25/2003
Title: How to use the PM program at a field office
Presenter D.Dyer **Location** Modesto, CA

Date presented: 12/9/2003
Title: The use of PMC for BOR production of seed
Presenter D.Dyer **Location** PMC, Lockeford

Date presented: 12/12/2003
Title: EBMUD use of the PM program
Presenter D.Dyer **Location** Lockeford

Date presented: 12/19/2003
Title: Plant materials used for wildlife improvement
Presenter D.Dyer **Location** Lockeford PMC
Date presented: 2/23/2004
Title: Status of field trials evaluating perennial grasses for carbon seq.
Presenter E. Beardsley and D.Dyer **Location** Saint Luis, MO

Date presented: 2/23/2004
Title: Lockeford PMC
Presenter D.Dyer **Location** Saint Luis, MO

Date presented: 3/24/2004
Title: Seed collection methods
Presenter D.Dyer **Location** Fresno BOR

Date presented: 4/16/2004
Title: Plant materials improving the environment
Presenter D. Dyer **Location** PMC

Date presented: 4/22/2004
Title: How new NRCS staff can use Plant Materials
Presenter D.Dyer **Location** Lockeford PMC

Date presented: 4/22/2004
Title: Plant materials for new NRCS staff
Presenter D.Dyer **Location** Lockeford PMC

Date presented: 5/10/2004
Title: NRCS programs used to control invasive species
Presenter D.Dyer **Location** Sacramento, CA

Date presented: 5/27/2004
Title: Training for new NRCS Staff
Presenter D.Dyer **Location** Lockeford PMC

Date presented: 6/14/2004
Title: How to calibrate a seed drill
Presenter D.Dyer **Location** Lockeford PMC

Customer Assistance Provided by CAPMC

Date	Customer Name	Affiliation	Cust. Type	Gend.	Race	Information	How Prov.	Staff	Time (minutes)
6/10/200 project	Athena Demetry phone	DAD Service Sequoia and Kings Canyon NP	USDI 15	National Park	CO	Fema	White	Review of NPS	
6/10/200	Don Hankins	US Fish & Wildlife Service Endangered Species Division	CO	Male	American Indian/	Review of PMC study	in person	DAD	60
6/10/200	Ken Lair	BOR	CO	Male	White	Evaluation of BOR plants	in person	DAD	4000
6/5/2004	Victor Schaff	somis	CO	Male	Hispanic	New common name for Zorro	phone	DAD	200
6/3/2004	Cheryl Lambert	Salinas Service Center, CA	FO	Fema	White	Evaluation of cover crop CFT	in person	DAD	660
5/10/200	Steve Griffith	USDA-ARS	CO	Male	White	Collection of plant materials for carbon study	in person	DAD	400
5/7/2004 600	Vern Boyett	Boyett Ranch	CO	Male	White	Conservation plan map development		in person	DAD
5/5/2004	Sharon benes	CSU Fresno	CO	Fema	White	Review of grants for grad students	e-mail	DAD	20
4/29/200	Joe Gallow	Merced	GE	Male	White	Native plants used in wildlife buffers	in person	DAD	200
4/28/200	Erik Beardsley	Red Bluff Service Center, CA	FO	Male	Hispanic	Data collection for carbon CFT	in person	DAD	660
4/26/200	John Weatherford	Woodland Service Center, CA	FO	Male	White	Data collection for Carbon CFT	in person	DAD	660
3/24/200	Ken Lair	BOR	CO	Male	White	Meeting to review seed collection issues	in person	DAD	600
3/22/200	Steve Griffith	USDA-ARS	CO	Male	White	Bio fuel samples	in person	DAD	200

3/19/200	Diane Holcomb	California NRCS State Office	SO	Fema	White	Veg guide data	e-mail	JH	1440
3/19/200	Victor Schaff	S and S seeds Co.	CO	Male	Hispanic	Clairify common name of Zorro	phone	DAD	90
3/10/200	Rob Wilson	Coop ext. service	CO	Male	White	Obtain seed for study	in person	DAD	300
3/8/2004	Deb Happe	SWCS	GE	Fema	White	review of SWCS web site	e-mail	DAD	60
2/19/200 studies	Phil Blake phone	Napa Service Center, DAD CA	30	FO	Male	White	Review of range seeding		
2/19/200	Russ Haas	PM Technical Advvisor - National Park Service, CO	OT	Male	White	NPS report	e-mail	DAD	300
2/19/200	Sharon Benes	CAL State Univ Fresno	GE	Fema	White	Review of poster and development into tech note	in person	DAD	200
2/13/200	Jennifer Golder	Red Bluff Service Center, CA	FO	Fema	White	Review of use of transline or 2-4D	e-mail	DAD	20
1/30/200	Dick McKleary	Fresno Area Office, CA	OT	Male	White	Review of native american plant propagation facility	in person	DAD	400
1/29/200	Joe Mota	Modesto Service Center, CA	FO	Male	Hispanic	Review and design of windbreak around sewage pond.	in person	DAD	500
1/23/200 200	Ceci Dale-cesmat	Susanville Service Center, CA	FO	Fema	White	seed for range seeding study, and layout	phone	DAD	
1/22/200	Ken Lair	BOR	CO	Male	White	review plants in field	in person	DAD	600
1/20/200	Ann Francis	Alturas Service Center, CA	FO	Fema	White	PMC advisory committee, involvement with CNGA, contribution aggreement.	in person	DAD	200
1/19/200	Dave Burgdorf	Michigan Plant Materials Specialist,	OT	Male	White	Development of bio-fuel proposal	e-mail	DAD	400

		MI							
1/13/200	Karl Striby	Templeton Service Center, CA	FO	Male	White	Range seeding study development	phone	DAD	45
12/30/20	Ann Francis	Alturas Service Center, CA	FO	Fema	White	CNGA annual meeting	phone	DAD	45
12/30/20	Bob wisecarver	Open space foundation	GE	Male	White	Plants used in wildlife habitat development	in person	DAD	120
12/30/20 120	Charles Davis	California NRCS State Office	SO	Male	Black	Use of Kochia shrub on LA fire reveg areas		e-mail	DAD
12/30/20	Vern Boyett	Boyett Ranch	CO	Male	Hispanic	Conservation planning	in person	DAD	200
12/29/20 20	Tom Jones	USDA-ARS Utah State Univ.	CO	Male	White	Research on chrom. # of cucamonga using ARS Logan lab.		phone	DAD
12/28/20	Cheryl Lambert	Salinas Service Center, CA	FO	Fema	White	Planting of CFT	in person	DAD	1200
12/22/20 mail	Steve Schoenig DAD	120	CDFA	CO	Male	White	Review of state weed plane-		
12/20/20 120	Don Hankins	US Fish & Wildlife Service Endangered Species Division	CO	Male	American Indian/	Review of PMC research on river area.		in person	DAD
12/15/20	Steve Diers	EBMUD	GE	Male	White	Tour of PMC and use of PM for wildlife	in person	DAD	140
12/12/20	Jerry Reioux	California NRCS State Office	SO	Male	White	Review of S. oak death tech note.	e-mail	DAD	60
12/9/200	Ken Lair	BOR	CO	Male	White	BOR Staff review of PMC contract.	in person	DAD	400
12/3/200	Bob Long	Placerville Service	FO	Male	White	Planting of vetch plots at hunt club	in person	DAD	400

		Center, CA							
12/2/200 700	Karl Striby	Templeton Service Center, CA	FO	Male	White	Review range seeding issues at Chuck Prichards ranch. Determine CFT scope.	in person	DAD	
11/26/20	Richard Ferrys	Stockton	GE	Male	White	Seeding mix to control weeds	phone	DAD	45
11/24/20 17	Chris Davis	Sacramento Service Center, CA	FO	Male	White	Yellow star T. review of reveg efforts		e-mail	DAD
11/24/20 600	Don Twist	Army Corps	CO	Male	White	Seeding and pluging of RIO to meet FEMA cert for American river.		in person	DAD
11/20/20 tansfur of seed	Athena Demetry	e-mail Service Sequoia and Kings Canyon NP	USDI DAD	National Park 200	CO	Fema production information.	White	Technology	
11/19/20	Bill Ward	California NRCS State Office	SO	Male	White	EWP seeding mix	e-mail	DAD	500
11/19/20 25	Dave Amme	Caltans	GE	Male	White	Review of Cucamonga chromosome #		e-mail	DAD
11/19/20	Rita Bickel	NRCS Area Office, CA	OT	Fema	White	Review of use of rice straw on LA fires reveg areas	e-mail	DAD	70
11/17/20 60	John Brodie	Stockton Service Center, CA	FO	Male	White	Letter of support for watershed work, SJ CO RCD		mail	DAD
11/15/20	Debra Debton	EPA	CO	Fema	White	Review of research effort on chem. Up take in ag. Ditches with ARS and EPA	phone	DAD	60
11/13/20	Rita Bickel	NRCS Area Office, CA	OT	Fema	White	Fire seeding and PM tech notes	phone	DAD	30

11/1/200	Bill Ward	California NRCS State Office	SO	Male	White	Update FS-51 fact sheet	e-mail	DAD	200
10/31/20	Diane Holcomb	California NRCS State Office	SO	Fema	White	Info sent out to all CA staff on PM tech notes and seed to use on S. CA fire areas	e-mail	DAD	500
10/31/20	Jake Sigg	CNPS	CO	Male	White	Review of use of Rye grass on LA	phone	DAD	15
10/31/20	Scott Stewart	Conservaseed	CO	Male	White	LA fire seeding, type of seed in storage		phone	DAD
20									
10/29/20	Steve Jewit	Somis Service Center, CA	FO	Male	White	Review of Arundo CFT	in person	DAD	1000
10/28/20	Bob Bailey	Redding Service Center, CA	FO	Male	White	Seed production info	phone	DAD	25
10/28/20	Dawn Afman	Santa Maria Service Center, CA	FO	Fema	White	Seed mix review	e-mail	DAD	23
10/28/20	Ken Lair	BOR	CO	Male	White	Review of BOR contract at PMC. PMC oppoerations to produce seed	in person	DAD	400
10/28/20	Mary Jane	Modesto Service	FO	Fema	White	Training on use of PM in WRP areas		in person	DAD
600	Nelson	Center, CA							
10/28/20	Steve Schoenig		Natural Resources		CO	Male	White	Weed infophone	
DAD	14								
		Inventory and Analysis Institute							
10/22/20	Russ Haas	PM Technical Advvisor - National Park Service, CO	OT	Male	White	NPS contract review	e-mail	DAD	20
10/17/20	Julie Ammel	Escondido Service Center, CA	FO	Fema	White	Windbreak CFT info	e-mail	DAD	70

10/15/20	Vern Boyett	Boyett Ranch	CO	Male	Hispanic	Ranch planning, conservation plan	in person	DAD	200
10/14/20	Chuck Cambra	Stockton Service Center	CO	Male	White	Seeding rates	phone	DAD	13
10/7/200	Bob Hewitt	Redlands Service Center, CA	FO	Male	White	Review of Riverside-Corona RCD Resource Conservation Center	in person	DAD	1200
10/3/200	Walt Graves	UC Davis	GE	Male	White	Vetch reseach study	in person	DAD	500
10/2/200	Cheryl Lambert	Salinas Service Center, CA	FO	Fema	White	Review of CFT	e-mail	DAD	120
10/1/200	Karl Striby	Templeton Service Center, CA	FO	Male	White	EQUIP range planting seed establishment methods.	phone	DAD	36
10/1/200	Kelly Rooney	Celpril	CO	Male	White	Doing research on seed coatings	in person	DAD	600

PMC Seed Production of NRCS Releases by CAPMC

	Foundation Seed			Certified Seed			Common Seed			
Release/Symb	**lbs.**	**$/lbs.**	**Valu**	**lbs.**	**$/lbs.**	**Valu**	**lbs.**	**$/lbs.**	**Valu**	**Total**
Berber / DAGL	72	$10.00	$720	0	$0.00	$0	0	$8.00	$0	$720
Blando / BRHOH	0	$0.00	$0	0	$0.00	$0	0	$2.00	$0	$0
Casa / ATLE	12	$15.00	$180	0	$0.00	$0	0	$0.00	$0	$180
Cucamonga / BRCA5	0	$0.00	$0	0	$0.00	$0	0	$6.00	$0	$0
Cuesta / CEFL4	0	$0.00	$0	0	$0.00	$0	0	$0.00	$0	$0
Dorado / CLIS	15	$10.00	$150	0	$0.00	$0	0	$0.00	$0	$150

Duro / ERFA2	10	$20.00	$200	0	$0.00	$0	0	$0.00	$0	$200
Lana / VIVIV8	0	$0.00	$0	0	$0.00	$0	0	$1.20	$0	$0
Lassen / PUTR2	2	$60.00	$120	0	$0.00	$0	0	$0.00	$0	$120
LK115d Germplasm / NAPU4	0	$60.00	$0	0	$0.00	$0	0	$50.00	$0	$0
LK215e Germplasm / NAPU4	0	$60.00	$0	0	$0.00	$0	0	$50.00	$0	$0
LK315d Germplasm / NAPU4	0	$60.00	$0	0	$0.00	$0	0	$50.00	$0	$0
LK415f Germplasm / NACE	0	$60.00	$0	0	$0.00	$0	0	$50.00	$0	$0
Maleza / CECO	0	$0.00	$0	0	$0.00	$0	0	$0.00	$0	$0
Marana / ATCA2	32	$15.00	$480	0	$0.00	$0	0	$0.00	$0	$480
Mariposa / ELGL	0	$0.00	$0	0	$0.00	$0	0	$15.00	$0	$0
MonteFrio / TRHI4	0	$0.00	$0	0	$0.00	$0	0	$4.00	$0	$0
Perla / PHAQ	44	$10.00	$440	0	$0.00	$0	0	$7.00	$0	$440
Rio / LETR5	0	$0.00	$0	0	$0.00	$0	0	$40.00	$0	$0
Sierra / ERUMP	8	$50.00	$400	0	$40.00	$0	0	$0.00	$0	$400
Wilton / TRHI4	0	$0.00	$0	0	$0.00	$0	0	$4.00	$0	$0
Wimmera 62 / LORI	0	$0.00	$0	0	$0.00	$0	0	$1.00	$0	$0
Zorro / VUMY	0	$0.00	$0	0	$0.00	$0	0	$7.00	$0	$0
Total Value for |[state]|:	195		$2,690	0		$0	0		$0	$2,690
Grand Totals:	195		$2,690	0		$0	0		$0	$2,690

PMC Vegetative Production of NRCS Releases CAPMC

Release / Symbol	Type	Clas	Amount	Value (each)	Total
Casa / ATLE	Container	Foundation/G1	4,000	$1.25	$5,000
	Total for Release:		4,000		$5,000
Dorado / CLIS	Container	Foundation/G1	1,000	$1.25	$1,250
	Total for Release:		1,000		$1,250
Duro / ERFA2	Container	Foundation/G1	3,500	$1.25	$4,375
Duro / ERFA2	Container	Foundation/G1	2,000	$1.25	$2,500
	Total for Release:		5,500		$6,875
Marana / ATCA2	Container	Foundation/G1	4,000	$1.25	$5,000
	Total for Release:		4,000		$5,000
Rio / LETR5	Liners	Foundation/G1	12,000	$0.20	$2,400
	Total for Release:		12,000		$2,400
Sierra / ERUMP	Container	Foundation/G1	2,500	$1.25	$3,125
	Total for Release:		2,500		$3,125
Total for State (all releases):			29,000		$23,650
Grand Total (all states, all releases):			29,000		$23,650

Other Production for CAPMC

Vegetative Production:

Stock Type	Amount	Purpose	Comment
Liners	19000	field planting	
Liners	55000	field planting	
Liners	15000	reimbursable	NPS
Liners	5000	field planting	

Commercial Seed Production of NRCS Lockeford PMC Releases

	Foundation			Certified Seed			Common Seed			
Release/Symb	lbs.	$/lbs.	Value	lbs.	$/lbs.	Value	lbs.	$/lbs.	Value	Total
Akaroa / DAGL	0	$0.00	$0	0	$0.00	$0	5000	$6.00	$30,000	$30,000
Berber / DAGL	0	$10.00	$0	0	$0.00	$0	10000	$8.00	$80,000	$80,000
Blando / BRHOH	0	$0.00	$0	0	$0.00	$0	120000	$2.00	$240,000	$240,000
Cucamonga / BRCA5	0	$10.00	$0	0	$0.00	$0	80000	$6.00	$480,000	$480,000
Cuesta / CEFL4	0	$0.00	$0	0	$0.00	$0	0	$0.00	$0	$0
Dorado / CLIS	0	$10.00	$0	0	$0.00	$0	0	$0.00	$0	$0
Lana / VIVIV8	0	$0.00	$0	0	$0.00	$0	140000	$1.20	$168,000	$168,000
Lassen / PUTR2	0	$0.00	$0	0	$0.00	$0	0	$0.00	$0	$0
LK115d Germplasm / NAPU4	0	$60.00	$0	0	$0.00	$0	200	$50.00	$10,000	$10,000
LK215e Germplasm / NAPU4	0	$60.00	$0	0	$0.00	$0	300	$50.00	$15,000	$15,000
LK315d Germplasm / NAPU4	0	$60.00	$0	0	$0.00	$0	100	$50.00	$5,000	$5,000
LK415f Germplasm /	0	$60.00	$0	0	$0.00	$0	200	$50.00	$10,000	$10,000

NACE										
Maleza / CECO	0	$0.00	$0	0	$0.00	$0	1000	$6.00	$6,000	$6,000
Marana / ATCA2	0	$0.00	$0	0	$0.00	$0	0	$0.00	$0	$0
Mariposa / ELGL	0	$40.00	$0	0	$0.00	$0	4000	$15.00	$60,000	$60,000
MonteFrio / TRHI4	0	$0.00	$0	0	$0.00	$0	5000	$4.00	$20,000	$20,000
Panoche / BRRU2	0	$0.00	$0	0	$0.00	$0	0	$0.00	$0	$0
Perla / PHAQ	0	$10.00	$0	0	$0.00	$0	12000	$7.00	$84,000	$84,000
Rio / LETR5	0	$0.00	$0	0	$0.00	$0	3000	$40.00	$120,000	$120,000
Sierra / ERUMP	0	$50.00	$0	100	$40.00	$4,000	0	$0.00	$0	$4,000
Wilton / TRHI4	0	$0.00	$0	0	$0.00	$0	5000	$4.00	$20,000	$20,000
Wimmera 62 / LORI	0	$0.00	$0	0	$0.00	$0	10000	$1.00	$10,000	$10,000
Zorro / VUMY	0	$9.00	$0	0	$0.00	$0	50000	$7.00	$350,000	$350,000
Total Value for		0	$0	100		$4,000	445800		$1,708,000	$1,712,000
Grand Totals:		0	$0	100		$4,000	445,800		$1,708,000	$1,712,000